2003 Annual Report *of the* Advanced Technology Program Advisory Committee

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I. INTRODUCTION:

The ATP Advisory Committee is comprised of prestigious individuals from industry, academia, and non-profit organizations with an interest in and knowledge of issues related to advanced technology and economic development. Its charter can be found on ATP's website at: www.atp.nist.gov.

The Committee acts in the public interest to:

- Provide advice on ATP programs, plans, and policies;
- Review and critique ATP evaluation efforts;
- Assess the degree of success of ATP in achieving its legislatively mandated mission;
- Function solely as an advisory body, in accordance with the provisions of the Federal Advisory Committee Act.

This annual report includes one Committee meeting in 2002 and two meetings in 2003:

- May 14, 2002
- March 11, 2003
- November 13, 2003

(The January 2002 meeting was included in the 2001 Annual Report.)

Each meeting consisted of public sessions during which ATP personnel briefed the Committee on plans, accomplishments, concerns, and issues. In addition, as noted in this report, the Advisory Committee often heard from outside experts in science and technology policy, including representatives from other nations. Panel discussions helped to highlight important issues affecting ATP.

The meetings also included brief closed sessions during which budget issues were discussed and the Committee's recommendations were formulated. Following each meeting, minutes were prepared and posted on the ATP website. During and at the conclusion of each meeting the Committee provided feedback and advice to ATP and NIST management.

The Committee has found the Advisory Committee meetings to be intellectually stimulating. NIST and ATP are receptive to advice, and the Committee members feel that they have been able to contribute to further improving an already excellent program.

The section that follows (Section II) documents the Committee's findings and recommendations.

Section III summarizes the three meetings that have taken place during this reporting period.

The Appendices provide information on ATP evaluation reports published since the last annual report, as well as information about recent competitions.

II. FINDINGS AND RECOMMENDATIONS

Findings:

1. ATP continues to fill an important need by encouraging companies to undertake high-risk R&D that has promise for significant benefits to the U.S. economy. While the SBIR program also addresses this need, a study by Harvard University Professor Lewis Branscomb and colleagues showed that ATP funding represents a much more significant component of early stage high-risk R&D funding than previously appreciated.

2. ATP management has continued to refine and improve program operation during the past two years. Electronic submission of proposals and multiple deadlines per year, which were being implemented when the last annual report was written, are now well established, and are good examples of customer-friendly features implemented by ATP. Program operational improvements also enable the Program to be more nimble and responsive to advances in R&D and changes in industry.

3. ATP has strengthened its ties with state agencies and with other Federal agencies. This has led to wider support for the program and created new opportunities for synergism.

4. ATP's economic assessment program is increasingly recognized as a model for other Federal R&D agencies.

5. Science and technology policy makers in other countries monitor the ATP carefully, and a number of countries have implemented or are implementing programs modeled after the ATP, reflecting their assessment that ATP is a highly successful program deserving of emulation.

6. ATP fills a critical gap in the research and development process, and its benefits substantially outweigh its costs. The Committee believes that continuing efforts are needed to improve understanding by policymakers and the public of the Program's underlying philosophy, its track record, and the assessments completed to date.

Recommendations:

1. ATP should continue to work with other Federal agencies to seek opportunities for mutual benefit. The Department of Homeland Security and NIH seem to be particularly promising agencies where cooperation with ATP could have mutual benefits.

2. ATP should continue working with state technology and economic development agencies to coordinate Federal and state efforts to stimulate economic growth. In addition, ATP should continue working with universities to foster more industry-university cooperation in high-tech fields.

3. ATP should consider thematic competitions in areas deemed particularly important to our national well-being. ATP has the legislative authority to run competitions and manage projects for other agencies, and there appear to be cases where this would be prudent for the nation.

4. As noted in Finding No. 6, misconceptions about what the ATP is and how it operates can still be found among some high-level policy makers. Achieving more budget stability from year to year is critical. The annual acrimonious debates over ATP's budget have taken their toll in terms of optimal program management. Morale within ATP is surprisingly high considering the uncertainty that has surrounded ATP for so many years. The Committee hopes this debate can finally be put to rest. The Committee may need to play a larger role in helping decision makers understand ATP's mission and role in the U.S. innovation system.

III SUMMARY OF COMMITTEE MEETINGS

1. May 14, 2002 ATP Advisory Committee Meeting

Two new Committee members were introduced at this meeting: Eric Haseltine and Linda Powers.

Panel Discussion: The Role of Universities in ATP

A significant portion of this meeting was devoted to a panel discussion on the role of universities in the ATP. An increased role for universities was a key element of Commerce Secretary Evans' February 2002 report on the ATP (The Advanced Technology Program: Reform with a Purpose). Pat Windham of Windham Consulting chaired the panel. Other members were: Christina Gabriel of Carnegie Mellon University, Denis Gray of North Carolina State University, Christopher Hill of George Mason University, and Charles Wessner of the National Research Council.

The Secretary's report raised two important issues regarding the role of universities in ATP:

- What is the general state of university-industry relations today, and how can the ATP best participate in these activities?

- What are best practices in university-industry R&D partnerships? What would a good university-led proposal-one that meets ATP criteria-look like?

The panel members addressed these and other issues.

There is tremendous diversity in attitudes and practices among universities with regard to their partnering with industry. Whereas universities previously relied primarily on the Federal government for research support, universities today are increasingly interested in teaming with industry. Managing industrial partnerships is an increasing administrative challenge for universities.

Universities usually insist on owning the intellectual property resulting from their research. The Bayh-Dole Act gives universities intellectual property rights in federally funded research projects. Companies (especially small companies) are typically reluctant to give universities IP rights for industrially funded work. State laws on intellectual property vary considerably and this further complicates an already complex issue.

A rapid succession of disruptive technological changes has led to much more intense competition among leading technology companies. Sprawling, campus-like central R&D laboratories, where long-term research was carried out without specific direction, have become a luxury few companies feel they can afford in this climate. In particular, the many large industrial research laboratories such as AT&T Bell Laboratories, IBM Research, Xerox PARC, and RCA Labs, to name a few, that were considered healthy and stable up through the 1980's, have all either disappeared completely or undergone downsizing along with drastic internal culture changes. Today nearly all industrial R&D is much more short-term "D" than long-term "R" and even academic research is under pressure to become more productive and geared narrowly to the shorter-term goals of both industry and government sponsors.

Industry depends on universities more than ever before and university research increasingly reflects industrial trends. Those universities that understand how to craft exciting, Ph.D.-quality research projects that are cognizant of the eventual application have been most successful.

Data from the national survey of the Association of University Technology Managers indicates that most universities generate revenue from technology transfer that is well under 3 percent of their total sponsored research expenditures. Each year, a

handful of universities have "lucky hits" that exceed this average, but the winners at this game are different every year. That is, tech transfer is a highly speculative endeavor; although universities overall do a bit better every year, there is no predictable pattern of success.

Industry support to universities is the fastest growing portion of the nation's R&D budget. Government and industry support is critical for the health of university research programs. Faculty attitudes towards industrial support have shifted. Today, a majority of faculty members support crediting patents in faculty promotion decisions.

The National Science Foundation's Industry-University Cooperative Research Centers Program (IUCRC), has been quite successful in fostering industry/university cooperation. Its goals include promoting industrially relevant research at universities, technology transfer, and graduate education that prepares students well for positions in industry.

The following factors tend to characterize successful university-industry partnerships:

- Complementary objectives, mutual respect;
- Active, routine communication;
- Cross-pollination of ideas;
- Multiple approaches (e.g., research collaborations, alumni networking, student career placement, innovation licensing, advisory committee services, and investment in university programs and long-term growth).

ATP offers a bridge between university research funding and private sector investment. The panel urged ATP to be flexible in permitting a diversity of university-industry partnering arrangements, since no single approach works best for all situations. The climate for industry-university R&D partnerships is positive and ATP could play a larger role in the future.

Some universities have very high overhead rates, which can be a problem. It could be a challenge for universities to manage ATP projects successfully.

The panel felt that ATP has led the way in defining how to evaluate Federal R&D projects. Not everyone in Washington recognizes ATP's expertise in this area, but there is evidence that ATP has become a best practice model for the world with regard to evaluation. Other nations are developing or have already developed programs resembling ATP to challenge the U.S. in new technology.

State and local officials are too often naive about what is going on elsewhere in the world in technology development. Too often there is a lack of leadership at the state and local level for fostering university-industry collaboration and a lack of appreciation of the importance of new technology for economic development. States sometimes create programs to encourage technology transfer from universities and then at the first sign of a budget crunch, the program is stopped. Often when a new governor takes office, technology transfer programs supported by the previous governor are halted regardless of merit.

States usually are required to have balanced budgets. When tax revenues fall off, something has to go, and discretionary grant programs for technology transfer are easier to cut than, say, road maintenance. Also, state governments often feel an obligation to spread money around the state somewhat uniformly rather than maintain programs as strictly merit-based. States do not generally have sustained professional efforts with highly competent technical staff like those employed by NSF and ATP. For those reasons, with a few exceptions, states are always likely to be marginal players in this arena.

Continuing outreach by ATP is important. The Advisory Committee may be able to play a greater role. There is still a lack of understanding of ATP within some of the states. ATP needs to continue to communicate the program's advantage to the states, while states need to make themselves more aware of the various federal grant programs and develop technology assets.

In-Q-Tel Presentation, Thomas Benjamin, CIA

In-Q-Tel is a private independent, non-profit corporation funded by the Central Intelligence Agency. Its mission is to identify and invest in companies developing cutting-edge information technologies of interest to the U.S. intelligence community. Because In-Q-Tel faces some of the same challenges that ATP faces, the experiences of In-Q-Tel were of interest to the Committee. There might be opportunities for synergy between ATP and In-Q-Tel.

While In-Q-Tel has some similarities to a high-tech venture capital firm, it is not concerned with a dollar return on investment to the CIA. Instead the goal is to stimulate the development of new technologies that could be critical to the CIA in the future. Nevertheless, In-Q-Tel wants the private firms it supports to be successful commercially lest they cease to exist. (Most companies supported by In-Q-Tel have not had government contracts previously.) All projects are unclassified. Funding to a given company is usually in the $1 to $2 million range. The CIA defines the technical problems they would like addressed by new technology. The In-Q-Tel Interface Center (QIC) is the link between the operating parts of CIA and In-Q-Tel, ensuring that CIA officials are aware of new developments in companies funded by In-Q-Tel and ensuring that companies are aware of CIA's needs. The QIC also serves to address insertion challenges while new products are still under development. Problem areas of interest include topics such as Internet search and discovery, enterprise knowledge management and visualization, information security and privacy, and distributed data collection/sensors.

In-Q-Tel has a distinguished Board of Directors, comprised of high-level people with long expertise in the private sector and the defense community.

The group, Business Executives for National Security, completed a Congressionally mandated review of In-Q-Tel in 2001 and concluded that it is a worthy endeavor that has made good progress to date, and should be continued. The Army is considering starting a program of its own analogous to In-Q-Tel.

In-Q-Tel welcomes closer involvement with ATP because projects funded by ATP could in some cases also be of interest to CIA, and because ATP speeds commercialization. ATP supports information technology projects that could be of interest to CIA. (ATP investment in IT projects to date is more than $500 million.) Currently, In-Q-Tel is restricted to information technology, but if this initial thrust proves successful, then In-Q-Tel could expand into other technical areas, and that would further enhance opportunities for ATP/In-Q-Tel cooperation. ATP and In-Q-Tel can share technical expertise.

In-Q-Tel's initial capitalization was $20-$25 million. The hope is that there will be a sufficient number of successes that In-Q-Tel will ultimately become self-sustaining.

In-Q-Tel differs from ATP in that the CIA provides the first customer for new products, whereas ATP does not.

ATP can accept funds from other federal agencies to operate competitions on their behalf, although so far no agency has utilized that provision of the ATP legislation. ATP can and should brief QIC regularly and will provide copies of abstracts of IT projects funded by ATP.

Competition Update - Bettijoyce Lide (ATP)

For the Fiscal Year 2001 ATP competition, 544 proposals were submitted in five batches. In the first three batches, 261 proposals were submitted, 71 semifinalists were selected, and 59 awards were made. In batches four and five, 283 proposals were submitted and 31 semifinalists were selected.

ATP applicants indicated that they prefer definite (rather than open-ended) batch ending dates.

Accordingly, in 2002 ATP announced three batch closing dates: June 10, July 31, and September 30. However, only proposals received by the June 10 date were considered for funding in fiscal year 2002. Proposers' conferences in Gaithersburg, San Jose, and Chicago were well attended. The ATP issued a revised proposal preparation kit in 2002.

ATP is continuing to employ the gated approach (where a complete proposal need not be submitted initially), technology-specific source evaluation boards, and prompt debriefings. All applicants now have the option of submitting proposals electronically.

The ATP has added additional administrative support to the board structure to make the deliberation process run more smoothly. There will be more emphasis on cross-board coordination to better accommodate proposals involving cross-disciplinary subject material.

About one third of the proposals get through the first gate, for technical merit. The majority of those submitted as full proposals then pass gate 2 for business merit. ATP's experience has been that proposals with excellent technical plans also tend to have good business plans.

Staff burnout is an ever-present concern, as ATP staff put in long hours, especially during competitions. The Program has streamlined the Source Evaluation Boards and invited more people from the NIST laboratories and other agencies to serve on them so as not to overburden ATP people. (Bringing in non-ATP people to serve on evaluation boards also provides technical expertise to supplement that resident within ATP.) It is possible to rotate staff on and off of boards so no one individual is required to serve on a board indefinitely.

Economic Evaluation of the Component-Based Software Program - Jeanne Powell (ATP)

Component-Based Software (CBS) was an early ATP focused program, with three competitions between 1994 and 1997. CBS is a concept designed to reduce software costs by developing software in interoperable modules so as to facilitate re-use. Proposers were encouraged to propose projects that would enhance interoperability across individual applications and in enterprise-wide applications. Barriers include a lack of automated tools for building and reusing software components, a lack of tools for non-programmers, and a lack of specifications for interface semantics.

In the three competitions, 24 projects were funded, of which 16 were completed. Three projects were still underway when the study was done. Two joint ventures selected for funding failed to coalesce. One single applicant made such unexpectedly rapid progress that the commercialization stage was reached before the scheduled end of the ATP project, and as a result, ATP support was withdrawn. Two projects experienced insurmountable technical difficulties.

The CBS program seemed to be a good candidate for early assessment since software tends to be commercialized more quickly than most other technology development areas. To evaluate this focused program, ATP hired a contractor experienced in evaluating the economic impact of R&D projects-RTI International of Research Triangle Park, North Carolina. As with all ATP evaluations, the goal was to examine all projects in this focused program, not just the successful ones, although some projects were selected for more in-depth study.

Conclusions of the RTI report:

- Small firms and start-ups would not have been able to obtain suitable financing without ATP.
- A large percentage of projects ultimately resulted in commercial products. (Small and start-up firms were much more likely to have generated commercial products than medium or large firms.)
- While achieving synergy among projects is one intent of focused programs, synergies proved to

be small and difficult to quantify for this program.

After examining the degree of success (or lack thereof) of all of the projects in this program, RTI selected eight representative projects for more in-depth study and, using the OMB-recommended discount rate of 7 percent, determined benefits-what economists refer to as consumer and producer surpluses. For the eight projects considered, RTI reported a net present value totaling $840 million, a social rate of return ranging from nothing to 360 percent, and benefit-cost ratios ranging from 0.37 to 39, with an average of 10.5. Most of the benefits came from one very successful project. Venture capitalists often see comparable results-they invest in a portfolio to spread the risk and more often than not, one or two successes produce most of the return on investment to the venture fund. The bottom line is that while some of ATP projects in this focused program failed, and while others achieved lackluster success, enough were highly successful that the total benefits to the nation from these ATP projects greatly exceed the cost of the ATP support.

The fact that small firms were more likely to commercialize than large firms is consistent with other studies. Large firms usually have a wide variety of R&D projects underway simultaneously and can afford to throw in the towel if they feel a particular project is not going well. By contrast, a small start-up firm tends to have all their eggs in one basket and so they must leave no stone unturned in trying to make the project succeed. A 1999 study also suggested that small firms are quicker to commercialize results from ATP projects.

High-risk R&D sometimes involves many years before the resulting products actually reach the marketplace. DARPA (the Defense Advanced Research Projects Agency) has recommended that projects be tracked for a decade or more to adequately quantify the resulting benefits. ATP agrees that a relatively long time frame is appropriate; consequently, ATP re-examines projects at two-, four-, and six-year intervals after projects end. Further, follow-up is carried out for projects that appear highly successful but particularly slow to mature, so an individual project might be tracked for a decade if deemed appropriate.

2. March 11, 2003 ATP Advisory Committee Meeting

Two new Advisory Committee members were introduced at this meeting: Michael Borrus and F. M. Ross Armbrecht, Jr.

ATP Status Update - Marc Stanley

In thirteen years of ATP competitions, 5,451 proposals were submitted to 42 competitions and 642 projects were awarded, with 1,329 participants. There has been approximately 50-50 government-industry cost sharing in the aggregate. More than 160 universities and 25 national laboratories have participated. 63 percent of ATP projects have been led by small businesses.

ATP funded emerging areas of technology such as DNA diagnostics, tissue engineering, and nanotechnology before they became "hot areas" that captured the public's attention. Cumulative benefits and impacts of the Program are substantial. A study by Professors Branscomb and Auerswald of Harvard found that ATP and SBIR together account for a surprisingly large share of funding for early stage technology development (21 to 25 percent).

R&D performed in China by U.S. and other companies is on the increase, and erosion of R&D in the United States is a legitimate concern. Prosperity in the U.S. is enhanced by having R&D on the high-tech end of the R&D spectrum performed in the U.S. Low-tech industries tend to migrate where labor costs are lower, but if leadership can be maintained in high-tech fields, the U.S. will benefit. In China (and in some other countries), in-country investment in R&D may be required of companies that wish to conduct trade. This is a new twist on the old approach of requiring companies that wished to sell products to China to establish manufacturing facilities in China.

International Panel

A major portion of this meeting was devoted to a discussion of how other nations are encouraging high-risk research in industry. A distinguished panel spoke to this issue: Charles Wessner (National Research Council, Moderator), Michel Mirota (Canada), Thomas Multhaup (Germany), and Hironori Nakanishi (Japan).

In a global economy, the U.S. is challenged in diverse areas such as steel, communications, Global Positioning System technology, aircraft, and semiconductors. The many high paying jobs associated with these industries are the objective of the national policies of a number of countries. It is important that ATP keep abreast of programs in other nations to stimulate advanced technology R&D because the U.S. has no monopoly on innovative R&D.

Canada:

Mr. Mirota described efforts by the Canadian government to foster R&D. The National Research Council's (NRC-Canada) Industrial Research Assistance Program (IRAP) is designed to stimulate innovation and facilitate R&D collaborations. The focus is on pre-competitive assistance to small and medium-sized firms. IRAP provides advice and funding and encourages networking and partnerships. While an advisory service dates back to 1947, the principal IRAP activities began in 1962.

The delivery of services is decentralized (160 offices throughout Canada) and decisions are made quickly. Decisions on small projects (~C$15 K) can be made within about two weeks. For larger projects, up to C$0.5M, decisions typically can be made within 30-90 days. Current funding is approximately C$150M. (Note: while the exchange rate between Canadian

and U.S. dollars fluctuates, at the time of this meeting a Canadian dollar was worth approximately 70 cents U.S., hence U.S. dollar equivalents of the figures quoted in this section would be roughly seventy percent of the Canadian amounts.)

A typical project is one to three years and may involve conditionally repayable loans. In addition to supporting R&D projects, IRAP has a Technology Visits Program that encourages companies to visit other companies to hear about best practices, and IRAP partially subsidizes visits of people from industry to government and university labs.

To participate, companies must be incorporated in Canada and be able to exploit the results of the work in Canada. Mirota's charts documented the criteria for project selection, which are analogous to those used by ATP. Funded projects cover a wide variety of disciplines, including but not limited to information and communications, life sciences, manufacturing and materials, energy, and environment.

Mirota also described the Technology Partnerships Canada program--a C$300M loan program directed at small and medium sized firms. It involves repayable contributions of up to 1/3 of the eligible project costs, not to exceed C$500K, for projects in environmental technologies, aerospace and defense, and enabling technologies.

NRC-Canada encourages international linkages and international collaboration. Sample audits are conducted and questionnaires distributed to determine and quantify the benefits of their programs.

Mirota noted that accurate assessment is challenging. Among other factors, attributing benefits to contributions from IRAP is difficult because there may be multiple sources of funds in addition to the IRAP funding. Another complication is that to assess properly the benefits to Canada as a whole, one must consider not only the benefits for the company receiving IRAP help, but any displacement that might occur in competing firms. IRAP has engaged in international benchmarking, comparing and contrasting its program to similar programs in other nations.

Companies participating in the program can get follow-up awards. There are connections to the venture capital community via mentoring arrangements and an entrepreneurial program designed to help scientists learn to write better business plans.

Germany:

Dr. Thomas Multhaup of the German Ministry of Economics and Labor (BMWA) described the variety of BMWA programs related to technology policy, with concentration on two of them. The Pro Inno Program and the Innonet Program. He pointed out that in addition to funding, there are other important R&D policy issues such as human capital, tax policy, opening of markets, and intellectual property rights.

BMWA supports basic/pre-competitive research, with special emphasis on small and medium-sized firms and on firms located in the former East Germany. They foster linkages between public research and private businesses and strive to increase the availability of venture capital. Like ATP, they avoid "picking winners and losers." And, like ATP, their policy is to foster market-driven research of industry-led projects.

Ninety-nine percent of enterprises in Germany have fewer than 500 employees. Small, high-tech firms are increasingly important in the German economy.

The Pro Inno Program is similar to ATP in that it is industry-led and technology neutral. Projects are close to market but must involve a new innovation step. Grants are made for new national and transnational research cooperation, and for initiating cooperation with and exchange of personnel with other research institutions. Cross-sector technologies are especially welcomed. In the 1999-2001 period, 2,650

companies received grants, and 77% of recipients were small firms with fewer than 50 employees.

The normal subsidy rate per the European Union Framework is 35 percent-25 percent for pre-competitive development plus 10 percent for small and medium-sized firms. Companies in the former East Germany receive an additional 10 percent bonus. Approximately 55 percent of applicants receive grants. Proposal submissions are on a continuous basis, with four- to five-week turnaround time.

Evaluation is an important task for BMWA. For example, they have found that there was on average an 8.3 percent improvement in employment, with 78 percent of firms reporting that the Pro Inno project contributed to retaining jobs.

BMWA is continuing to refine the program, for example, replacing "limitation of projects" with "maximum subsidy level," which should reduce current disincentives for larger projects. They also intend to improve participation in transnational projects, improve quality control, and improve ex-ante coordination of evaluation research.

The most frequent participants in transnational projects are Russia/CIS, Switzerland, Austria, USA, and China.

The Innonet Program seeks to improve pre-competitive technology transfer to small and medium-sized companies by providing incentives to research institutions to cooperate with small and medium-sized technology companies. These vertical or horizontal joint venture projects must involve four or more companies plus two or more research institutions. The average project involved 6.4 companies and 2.5 research institutes. Industries targeted are medical engineering, instrumentation and sensors, information technology, machine tools, and materials. Research institutions receive funding from the program, and the participating companies must pay 15 percent of the project cost. BMWA can fund up to 1.5 M Euros per project. Average project size is 1.2 M Euros. Total budget for 2004 is about 16 million Euros.

Sixty-five percent of firms participating have fewer than 50 employees. Large companies may participate, but receive no funding. Like the Pro Inno Program, project selection is rigorous and involves reviews by a project management agency separate from BMWA. This is a relatively new program (it began in 1999) so evaluation is only beginning.

Evaluation issues are much the same as those faced by ATP. To what extent would the investment have occurred without Innonet support? How do Innonet companies perform relative to companies that do not receive Innonet support? Like ATP, Innonet evaluation in part looks at portfolio statistics. Like the ATP and programs in other countries, it can be difficult to separate the effects of Innonet support from the effects of support from other funding sources. Nevertheless, early efforts at evaluation show that the program is having a positive effect on R&D and competitiveness.

Project evaluation, as far as close-to-market projects of the Pro Inno program are concerned, takes place on a continuous basis. For other (pre-competitive) programs like InnoNet, there is a yearly competition.

BMWA is working to increase the availability of venture capital (the BTU Program) by reducing the liability of venture capital firms. This spring BMWA is negotiating to set up a new public-private fund for early stage firms. The state bank does not select companies or projects, but invests only in cases where private investors see a promising investment. Data show a peak in availability of venture capital in Germany around 2000 (at the peak of "the Internet bubble"), but since then, the availability of funds has decreased dramatically. In today's economic climate it is difficult to launch IPOs (initial public offerings).

Japan:

Mr. Hironori Nakanishi noted that economic growth in Japan was rapid during much of the post-World War II period, but the growth rate has decreased in the last few years. Japan's current science and technology basic plan states "S&T is the driving force of sustainable development and for pioneering the future of humanity."

Nakanishi described recent developments in science and technology policy in Japan. In addition to S&T five-year plans, there has been some special legislation, e.g., legislation for a technology licensing office, an analog to the Bayh-Dole intellectual property legislation in the U.S., and a new program similar to the U.S. SBIR Program (Small Business Innovation Research). These new developments are too recent to permit assessment of their effectiveness.

The very well known Ministry of International Trade and Industry (MITI) is now the Ministry of Economy, Trade and Industry (METI). A new Ministry of Education, Culture, Sports, Science and Technology (MEXT) has been created and has absorbed several previous agencies.

The government's R&D investment is growing. Four areas of emphasis are:

- Life sciences
- Information and telecommunications
- Environment
- Nanotechnology and materials

MEXT's budget is 64 percent of Japan's total S&T budget.

The New Energy and Industrial Technology Development Organization (NEDO) has a current budget of 256 billion Yen (~$2.1 billion) of which 67 percent is R&D. It is an administratively independent institution.

Japan's "Teian-Kobo" competitive grant system for pre-competitive technology has some similarities to ATP and to NIH's grants programs. Its objective is to foster highly promising and innovative R&D activities as the "seeds" for future industrial technology. Grants go to young researchers, to high-risk, pre-competitive industrial projects, and to foster international collaboration research in the fields of energy and the environment. The second category, industrial technology development support, has many similarities to ATP. The project selection process used in Japan closely resembled the ATP process. Both technical merit and economic/business merit are considered. Thirty-five to forty awards per year are made, for projects up to two years in duration. Companies pay more than fifty percent of the project cost, although spin-off companies from universities and research institutions need pay only 1/3 of the project cost.

Funds must be used within the fiscal year. Typically it takes about three months for project decisions.

This program involves a recoupment provision, but Mr. Nakanishi felt that it has not worked well and that it should be eliminated.

About two years ago, the Japanese government adopted a "program" strategy to accomplish national goals. Where this approach is used, it goes well beyond the normal project strategy. In addition to supporting needed R&D projects, the program approach coordinates multiple R&D projects and also considers and deals with infrastructure barriers, such as codes and standards and intellectual property issues. Technology roadmaps help in understanding all that must be done to make a new technology successful. Within a program, R&D includes basic research, cooperative agreements, and project contracts.

Like other nations, Japan places a high priority on evaluation of programs and projects, and Mr. Nakanashi described his nation's approach. It

includes some of the same elements used in the U.S., Canada, and Germany.

Like the ATP, these other three countries have made a serious effort to evaluate program success. ATP and Rosalie Ruegg, the former head of ATP's Economic Assessment Office were praised by the panel for making systematic evaluation such an essential element of ATP and for sharing evaluation information with others.

The panel discussion and the discussion by the Committee that followed resulted in a consensus that the U.S. can learn much from the experiences of other nations and that information gathering such as this panel discussion should be continued. It is interesting that some foreign R&D partnership programs have been modeled after the ATP, which suggests that there is greater appreciation overseas regarding the importance of such programs than in the U.S.

Competition Report - Ms. Bettijoyce Lide, ATP Competitions Manager

For the 2002 competition cycle, three proposers conferences were held (Gaithersburg, MD; San Jose, CA; and Chicago, IL), with good attendance at each. The number of proposals was higher than expected (472, 136, and 467 in batches 1, 2, and 3, respectively). This was about double the number of proposals in 2001, and is the highest one-year total in ATP history, which suggests that interest in ATP is growing rather than shrinking. Approximately 1/4 of proposers took advantage of the opportunity to submit proposals electronically. Unsuccessful proposers who requested them received in-depth debriefings.

Forty awards were announced in September 2002, which included 7 joint ventures and 33 single applicants.

A success rate of about 12 to 13 percent, observed during this competition period, is typical of ATP open competitions. The percentage tends to be higher in focused program competitions (20 to 25 percent) which were used until 1999, probably because ATP worked closely with potential proposers in planning the scope and goals of focused programs so that by the time the programs were developed, the applicants understood the ATP criteria very well and were likely to submit competitive proposals to announced focused program competitions.

The ATP Evaluation "Toolkit" Project - Ms. Connie Chang, Economic Assessment Office

Ms. Chang provided background on the rationale for the project, and introduced Rosalie Ruegg and Irwin Feller, who carried out this study.

From the beginning ATP has viewed evaluation as extremely important, and began funding evaluation efforts early in the program's history. These efforts have grown and become more sophisticated over the past decade to the point where ATP is now often cited as having a model economic assessment program. The ATP was able to take passage of the Government Performance and Results Act (GPRA) in stride. GPRA's reporting requirements influenced ATP to collect systematically the particular kinds of data required to comply with the GPRA, as well as other types of data deemed important to ATP for continuous improvement.

ATP has carried out in-house economic assessment and has also funded studies by well-known academic and private sector assessment experts. These studies have helped to advance the state of the art of assessing public-private R&D partnerships.

The purpose of the toolkit project was to provide a compilation of evaluation tools and methodologies employed by those who have studied the ATP, and to summarize the principal findings of studies commissioned by ATP in its first decade. There is a general consensus that in addition to assessing the impact of the ATP, these studies, in the aggregate, have con-

tributed to a better understanding of effective methodologies for evaluating government-industry R&D partnerships.

Findings indicate that ATP is achieving its overarching objectives. Commercialization of new technologies is taking place and widespread economic benefits are resulting. ATP is leveraging private sector efforts, not substituting for them.

Dr. Feller presented ten recommendations for continued evaluation, and urged ATP to continue its extensive evaluation efforts. These ten recommendations (in no particular rank order) are:

1. Increase retrospective, market-data-based analyses.
2. Incorporate both direct- and indirect-path analysis in benefit-cost case study, including estimates of both market and knowledge spillovers.
3. Continue status reports of completed projects and, on a sample basis, repeat them further out in time.
4. Update information on state and foreign counterpart programs.
5. Further develop several of the promising new evaluation techniques.
6. Deepen analysis of knowledge spillovers beyond patent-only based studies.
7. Identify and address new questions that arise as ATP is modified.
8. Pursue analysis of failures and successes.
9. Continue an effective mix of in-house and external evaluation studies.
10. Take greater advantage of evaluation results in decision-making processes.

Dr. Feller commended ATP for being one of the most extensively evaluated Federal science and technology programs. He believes other programs have benefited from advances in the state of the art of program evaluation pioneered by ATP.

The performance metrics developed by ATP allow the program to respond well to the GPRA Act requirements. Furthermore, ATP's evaluation methods have been subjected to public scrutiny via peer review by academic economists.

ATP's budget for evaluation has grown as the program has grown. During the first year, systematic evaluation activity began with $25 K. About $50 K went into evaluation the following year, and as much as $2 M per year in some more recent years. Early in the process ATP arranged to have the National Bureau of Economic Research and other prominent researchers play a leading role, and this has helped to validate the credibility of the evaluation efforts.

No other Federal agency is believed to have as extensive an evaluation program as ATP. The Small Business Innovative Research (SBIR) Program has been subjected to much less scrutiny and rigorous evaluation than ATP. There are about ten agencies that carry out SBIR programs, five principal ones. Aside from several studies in the early 1980s, internal surveys conducted by several of the agencies, and GAO investigations, only recently have there been efforts to do more systematic evaluations of all SBIR activities, e.g., NRC's study of DOD's Fast Track Initiative and NRC's current study of the SBIR programs of the five leading agencies.

Open Discussion

The lack of stability in ATP has been a concern for potential applicants. Companies that might like to submit proposals are deterred because of uncertainty about whether the program will survive from year to year. One ATP study compared applicants who received awards to applicants who did not, and found that there was increased collaboration even in companies that did not win awards. (Preparing an ATP proposal often sensitizes companies to the potential benefits of collaboration.) Another conclusion was the presence of what has been called "The Halo Effect" for those who receive ATP awards. ATP awardees are more

likely to be able to find additional sources of private sector capital than non-awardees, presumably because receiving an ATP award validates the quality of the company's technical and business plans for the project.

When ATP was created, the threat from competitors in Japan and Europe was a major focus. Then the U.S. economy began to improve while Japan's economy declined, which is perhaps why some questioned the need for ATP. Now things are changing. Private sector R&D funds in the U.S. are drying up. Our economy is weaker. Today the Chinese are a bigger economic threat in S&T areas than Japan. High-tech job creation is once again important to the United States.

An advantage of ATP is that it is flexible. ATP can, for example, provide cost-shared funding in new areas like homeland security.

Companies that apply to ATP are at the cutting edge of technology. The media should know that ATP is an excellent source of technology news and expertise. When the news media report new technology breakthroughs, the work described may well be R&D that was funded in part by ATP, but unfortunately ATP is rarely mentioned.

3. November 13, 2003 ATP Advisory Committee Meeting

Homeland Security - Dr. Jane Alexander (HSARPA)

Dr. Jane Alexander, Deputy Director of the Homeland Security Advanced Research Projects Agency (HSARPA) of the Department of Homeland Security (DHS), briefed the Committee. DHS was established to protect the lives of U.S. citizens, our critical infrastructure, our economic welfare, and to help preserve our quality of life. HSARPA reports to Under Secretary for Science and Technology McQueary. Most operational units of DHS were moved to the new department from other Federal agencies, but the science and technology portion was created from scratch.

DHS is interested in a broad spectrum of technologies, ranging from projects that push the envelope of science to searching for off-the-shelf technologies that can be applied to the homeland security mission. Key threat areas of interest include biological, radiological and nuclear, chemical, high explosives, cyber defense, and threat vulnerability analysis. Rather than look at science and ask what it might do for homeland security, DHS typically tries to identify and prioritize the needs and then see how science might best be used to address those needs.

An important consideration is that DHS must understand and respond to the needs of first responders at the state and local level, including police, firefighters, and public health officials. Their capabilities, needs, and vulnerabilities vary greatly from one part of the country to another. One solution does not fit all. Cost considerations are extremely important. Compromises must be made so as to make the technology affordable. And, DHS does not have the authority to require local responders to adopt any particular technology.

In many cases, psychological factors affect technical decisions. For example, in examining clean-up technology for coping with a dirty bomb attack, the question arises, "How much cleanup will the public demand?" A strictly objective assessment taking into cost-benefit tradeoffs would probably conclude that it is not cost effective to clean up an area so as to make the readings of trace hazardous substances comparable to what they were prior to the attack (if such readings are known, which they usually are not), but fear of the unknown is powerful, and hence the public may insist on a greater degree of cleanup than can be justified on purely technical grounds.

Dr. Alexander noted that people do not necessarily take advantage of existing solutions for minimizing the potential for damage. For example, the impact of potentially damaging cyber attacks could be lessened if everyone would install software patches that are available to them, but people often fail to do so.

HSARPA will be concerned not only with research, but also with getting new products developed and into the market, so rapid prototyping will be important. Only 5-10 percent of HSARPA's funds are for revolutionary research. Ninety to 95 percent of the funds address identified DHS requirements. In management style, HSARPA will operate very much like DARPA, with program managers "owning" programs and actively leading them. Like DARPA, HSARPA has considerable flexibility, including using contracts, grants, cooperative agreements, and "other transactions," which allow project managers to devise whatever arrangements are deemed best for getting a particular task accomplished. This means that contractors who choose to work for HSARPA do not have to behave like defense contractors and employ a different approach to bookkeeping than they use for their non-Federal work.

Some companies are very concerned about protecting intellectual property and insist that only Federal employees review their proposals. So far HSARPA has drawn primarily from the DOD community. ATP's legislation permits NIST to accept funds from other Federal agencies to run special competitions

and manage projects on their behalf. If HSARPA feels that such an arrangement would be beneficial, ATP would welcome an opportunity to help.

Dr. Alexander noted that there are at least four different models for technology development and commercialization:

1. *DHS funds the development and buys the product*. This is the traditional DOD model with a single customer-the Federal government.

2. *State and local governments buy a technology developed by DHS*. Here large numbers of buyers have differing needs and resources.

3. *Commercial devices*. An example might be a chemical agent detector that could be made as cheaply as a smoke detector so that individuals as well as government agencies could purchase the product.

4. *An industrial market*. An example might be radiation detection devices that would be useful to the nuclear power industry but could also be used by DHS for monitoring purposes.

DHS must consider which of these approaches is the appropriate model for developing a given device or system.

To uncover potentially important new security technologies, especially in obscure small companies, HSARPA contacts high tech investment firms to get recommendations on companies that may have such technology. People from industry who are very familiar with who is doing what in a given area are asked to provide information. HSARPA calls upon organizations such as the Industrial Research Institute. Bidder conferences are widely publicized. They identify and work with technical communities that may have knowledge about new developments potentially useful to HSARPA, e.g., the high-energy physics community.

The Department of Commerce is willing to help DHS organize "tech expos" around the country to reach out to smaller firms. NIST has good industry contacts and may be able to help also.

Manufacturing Panel:

This panel was convened to address the current state of manufacturing in the U.S. and ATP's role in improving it. Its members included:

Dr. Dale Hall, Director, Manufacturing Engineering Laboratory, NIST; Moderator
Dr. Thomas Cellucci, Chief Operating Officer, Zyvex
Mr. Larry Rhoades, President, Extrude Hone Corp.
Mr. Richard Smith, Executive Vice President, Maxwell Technologies

Concerns over the erosion of manufacturing jobs have captured national attention recently. ATP has funded many projects related to manufacturing technology, some of which have been highly successful.

Since July 2000, 2.7 million manufacturing jobs have been lost in the United States. Countries such as Japan, China, and several in Europe have been stepping up their efforts to boost their manufacturing prowess. At one time the concern was that low skill manufacturing jobs were moving offshore, but today, in addition, more and more high-skill advanced manufacturing is being done elsewhere. Service industry jobs may also move offshore.

Manufacturing is becoming increasing high-tech, so workers need more training and skill. Productivity continues to increase and so does globalization. Flexible manufacturing, with increased customization is the trend. A coordinated U.S. strategy must including improving the infrastructure for manufacturing as a counter to labor rate differentials between the U.S. and other countries.

NIST is contributing to an improved manufacturing base in the U.S. through efforts by the NIST laboratories, the Baldrige National Quality Program, the

MEP, and the ATP. Nanotechnology is a good example of how NIST can provide standards, measurement methods, and make other contributions to the state of the art.

The U.S. trade deficit is more than $500 billion, and about 1/3 of all manufactured products consumed in the U.S. today are imported. The market share of the U.S. auto industry has fallen from 84 percent to 62 percent in the past 25 years. Our country has done well in agriculture and food processing, where we are self-sufficient, but in other areas of production, we need to be concerned.

In a relatively short time China has gone from a backward nation to a nation with world-class manufacturing. Today China produces a huge variety of goods.

Ideas to create a climate more favorable to manufacturing in the U.S. include boosting the nation's savings rate, channeling a large percentage of savings into industrial investment, putting more emphasis on education, and having a strong program to encourage the development of new manufacturing technologies. The panel felt that the ATP is an excellent program to address this need.

One of the reasons other nations have lower production costs is that they often do not have adequate environmental regulations. Tariffs may be needed to encourage such countries to protect the environment. Investments are needed in the U.S. manufacturing technology infrastructure (e.g., the technology equivalent of "roads and bridges").

Industry must recognize that an important U.S. competitive advantage is manufacturing process expertise. Protecting intellectual property related to that know-how is critical. Non-traditional business models can help, such as not selling capital equipment outright, but rather providing manufacturing process technology to OEMs (original equipment manufacturers) on a turnkey basis under a suitable ongoing fee system. That approach can help overcome reluctance to adopt new technology characterized by high up-front costs.

If the United States does not have high value goods to trade, we will have to trade our assets. The panel was concerned that the U.S. is too preoccupied with short-term strategies rather than with a long-term vision.

The speakers all expressed concern about the erosion of manufacturing prowess in the United States. In 1946 low-tech assembly jobs first began to migrate offshore, but today, high-tech manufacturing can be done almost anywhere in the world. In addition to lower labor rates, some foreign governments provide generous subsidies or tax breaks to manufacturing firms who locate in their countries. The U.S. Government has traditionally had a "hands-off" policy with regard to industrial policy, whereas some other countries aggressively seek to bolster their manufacturing firms. Most global companies require local sourcing, thereby creating local pockets of manufacturing. Globalization is a trend that cannot be ignored.

China has actually lost manufacturing jobs in recent years. This is largely because modern factories employing state-of-the-art automation are replacing old factories that relied on labor intensive manual assembly.

Since globalization cannot be halted, our nation must focus on those factors that we can control. Factors for success include:

- Low cost of capital and/or favorable tax treatment of long term capital
- Healthy equity markets (rewards for free enterprise)
- R&D tax credits
- ATP for emerging technologies
- Incentives (scholarships) for the best and brightest. (With rapidly rising college tuition, it is more difficult today for kids from low-income

families to get to college than it was a few years ago.)

- Capital incentives for the best and brightest in industry (e.g., stock options)
- Level environmental costs for imported goods (world standards for pollution control, etc.)

Large scale manufacturing of mature commodity items is not likely to be done in a cost-competitive manner in the United States. Therefore, the nation must encourage rapid innovation and strive to maintain a robust domestic manufacturing base for technology at the cutting edge.

The panel felt that protection of intellectual property around the world is an important issue. China's protection of IP may improve with time, but today, non-disclosure agreements are often not honored in China. In China, cheap labor applies to materials extraction (e.g., miners) as well as manufactured products. Finished products in China are sometimes priced less than the cost of the raw materials in the United States.

NIST can help companies take a longer-range view. NIST often convenes groups of companies in a given area of technology to discuss the state of the technology and future needs. This neutral third-party convener role is important, because direct competitors are usually reluctant to meet with each other because of concern about safeguarding trade secrets and other proprietary information, as well as concerns about anti-trust issues.

ATP Competition Report - Bettijoyce Lide (ATP Competitions Manager)

"Batch" competitions with closing dates of June 10, July 31, and September 30, 2002 were announced in the spring of 2002. Proposer conferences were held in San Jose, CA; Chicago, IL; and Gaithersburg, MD, and were well-attended (~800 attendees).

ATP's electronic submission system is fully operational, and about 1/4 of the proposers submitted electronically.

1,075 proposals were submitted in the three batches (nearly double the number in 2001) and 107 awards were made. The fact that only one out of ten proposals was selected for award demonstrates the high standards associated with winning an ATP award.

ATP provided oral debriefings to those who requested one - more than 70 percent of the unsuccessful proposers.

A survey of FY 2000 applicants indicated that 72 percent of those surveyed approved of the new gated approach that ATP is now using. The gated approach has the advantage that proposers do not have to prepare the entire proposal at the outset, thereby saving time for those who are unsuccessful. Eighty-two percent of those surveyed expressed general satisfaction with their ATP experience. A survey of FY 2002 applicants is in progress.

ATP has taken additional steps to further improve the selection process:

For the customers:

- A public calendar of key dates will be posted on the Internet
- Applicants are being allowed more time to complete gate 2 material
- Applicants are provided with feedback on their abbreviated business plan during the debriefing for the first gate

For NIST staff:

- ATP has identified reviewer pools of domain experts prior to competitions
- Periods during which technical reviews will be needed are announced in advance

- Liaison teams between ATP and the NIST laboratories have been established
- Improved, just-in-time training is being provided for new employees

EAO Status Report - Stephanie Shipp (Director, ATP Economic Assessment Office)

EAO is continuing its extensive evaluation effort and has issued twelve new reports in 2003, including:

- 4 Economic Studies
- 4 Policy Analysis Studies
- 2 Case Studies
- 1 Survey Data Results
- 1 Working Paper

A case study of an ATP project involving digital mammography and radiology showed huge benefits to the nation from the deployment this new technology. New radiology systems incorporating the technology developed in the ATP project are reducing the cost of medical diagnostic images and leading to fewer incorrect diagnoses (false positives or false negatives-both of which are traumatic for patients).

ATP's *Survey of Applicants, 2000* represents the second time that a survey of ATP applicants in a given year has been done; the first was in 1998. Plans are underway to begin data collection for the *Survey of Applicants, 2002* in January 2004. The survey is designed to address the counterfactual question "What would have happened without ATP funding?" by comparing the answers from awardees and non-awardees. In one comparison, (Factsheet No. 7), the key finding was that internal and external sources of funding for awardees increase, while for non-awardees, internal funding stays flat and external funding declines. In other words, awardees benefit from the 'halo' of receiving an ATP award.

ATP has written Status Reports for the first 100 completed projects. Status Reports are mini case studies written three to five years after ATP funding ends. These reports are now available on a searchable database available under Products and Services/ Status Reports for Completed ATP Projects, or directly at this link: http://statusreports-atp.nist.gov/basic_form.asp. A user can search for Status Reports by specifying the technology area, the star rating, the state of the lead company, or by specifying a word or group of words.

ATP recognized that it would be appropriate to develop a way to show people at a glance how well the ATP portfolio was performing. A system has been developed analogous to the "star" rating of hotels in travel guides. Each ATP project is assigned from zero to four stars based on a scoring system that takes into account a large number of factors indicative of success in meeting the ATP goals. When the first 100 projects were analyzed using this system, the following results were obtained:

- Four stars: 11%
- Three stars: 34%
- Two stars: 27%
- One star: 12%
- No stars: 16%

Projects will continue to be rated using this system. In addition to providing a rough indication of overall project success for all ATP projects, one can also derive interesting information by comparing projects based on certain factors, e.g. examining whether projects in one technical area are more or less likely to have multiple stars than projects in another area.

EAO's evaluation efforts were praised in a report from the recent National Research Council study of public-private partnerships. EAO is frequently asked to give talks about ATP's evaluation system.

Committee member Ross Armbrecht commented that during the past few weeks, in his work as President of the Industrial Research Institute, he had encountered three situations in which ATP was cited as a

model to emulate. He met with a representative of a Japanese organization who, in his written trip summary, recommended that Japan use an ATP-like program to foster technology development. During a visit to China, he was told "We now have an ATP Program." And, recently when he was in Switzerland, he was again told, "We are implementing an ATP Program." According to Mr. Armbrecht, "ATP is the gold standard now for stimulating economic growth by accelerating the development of new technology." He thinks that ATP is widely perceived overseas as being the most beneficial U.S. Government program for helping companies get through "the Valley of Death." (The "Valley of Death" refers to the time period following completion of basic research, but prior to the time when product development begins in earnest. During this period, the potential for return on investment is murky; hence it is difficult to justify substantial investments of private sector funds.)

Appendix 1

Economic Evaluation Reports for the Advanced Technology Program For the Period FY 2002-2003

Economic Report and Studies:

Understanding Private-Sector Decision Making for Early-Stage Technology Development. NIST GCR-02-841B. September 2003, (Special Issues Study), Demos (Booz Allen Hamilton), Auerswald, Branscomb, & Min (Harvard University).

Beyond Measure: A Profile of ATP Health Care Investments. August 2003. (Special Issues Study).

Powering Our High-Speed Economy: A Profile of ATP Energy Investments. August 2003. (Special Issues Study).

A Toolkit for Evaluating Public R&D Investment: Models, Methods, and Findings from ATP's First Decade. NIST GCR 03-857. July 2003, (Special Issues Study), Ruegg & Feller.

Bridging From Project Case Study to Portfolio Analysis in a Public R&D Program. NIST-GCR 03-851. August 2003. (Special Issues Study), Ruegg.

A Study of the Management of Intellectual Property in ATP-Awarded Firms. ATP Working Papers Series 00-01. August 2003. (Working Paper), Liebeskind.

Technology Adoption Indicators Applied to the ATP Flow-Control Machining Project. NISTIR 6888. May 2003. (Economic Study), Brown, Ehlen, & Powell.

Inter-Industry Diffusion of Technology That Results from ATP Projects. NIST GCR 03-848. April 2003, (Economic Study), Popkin.

Low-Cost Manufacturing Process Technology for Amorphous Silicon Detectors: Applications in Digital Mammography and Radiography. NIST GCR 03-844. February 2003. (Case Study), Pelsoci.

Measuring the Impact of ATP-Funded Research Consortia on Research Productivity of Participating Firms: A Framework Using Both U.S. and Japanese Data. NIST GCR 02-830. December 2002. (Economic Study), Sakakibara & Branstetter.

Program Design and Firm Success in the Advanced Technology Program: Project Structure and Innovation Outcomes. NISTIR 6943. December 2002. (Economic Study), Zucker, Darby & Wang.

Benefits and Costs of ATP Investments in Component-Based Software. GCR 02-834, November 2002. (Case Study), White & Gallaher (RTI).

Different Timelines for Different Technologies: Evidence from the Advanced Technology Program. NISTIR 6917. November 2002. (Survey Data Results), Powell & Morris.

Between Invention and Innovation: An Analysis of Funding for Early-Stage Technology Development. NIST GCR 02-841. November 2002. (Special Issues Study), Branscomb & Auerswald.

Universities as Research Partners. NIST GCR 02-829. June 2002. (Economic Study), Hall, Link & Scott.

The Art of Telling Your Story: Tips & Insights For Putting Your Best Foot Forward With Investors and Corporate Partners. NIST GCR 02-831. April 2002. (Special Issues Study), King.

Closed-Cycle Air Refrigeration Technology For Cross-Cutting Applications in Food Processing, Volatile Organic Compound Recovery, Liquid Natural Gas Industries: Economic Case Study of an ATP-Funded Project. NIST GCR 01-819. December 2001. (Economic Study), Pelsoci.

Determinants of Success in ATP-Sponsored R&D Joint Ventures: A Preliminary Analysis Based on 18 Automobile Manufacturing Projects. NIST GCR 00-803. December 2001. (Economic Study), Dyer & Powell.

Performance of 50 Completed ATP Projects, Status Report - Number 2, NIST SP 950-2. December 2001. (Special Issues Study), Advanced Technology Program.

In June 2003, the Economic Assessment Office (EAO) issued a series of twelve Factsheets presenting findings from the Survey of ATP Applicants 2000:

1. Why Do Companies Apply for ATP Funding?
2. Funding Sources for Innovative R&D
3. ATP Funds High Risk and Long Term R&D Projects
4. ATP Fosters New R&D Directions and Partnerships
5. ATP Helps Companies Work with Universities
6. ATP Promotes Public Benefits and Knowledge Diffusion
7. ATP Awards Attract Additional Funding
8. What Happens to Nonfunded Projects?
9. Time and Cost for ATP Proposal Preparation
10. Applicant Perceptions of the ATP Proposal Process
11. Descriptive Statistics for ATP Applicants: Company Size and R&D Effort
12. Survey of ATP Applicants 2000: Methodology and Respondent Characteristic

Status Reports
http://statusreports-atp.nist.gov/basic_form.asp

Fifty new status reports are now completed for a total of 100 Status Reports. (Three to five new Status Reports will be added to the website each month). Status Reports are available on a searchable website, or by going to www.atp.nist.gov and looking under Products and Services.

Factsheets
http://www.atp.nist.gov/eao/eao_pubs.htm

ATP Supports All Sectors of the Economy

The Characteristics of Large Firms in ATP Projects
ATP Stimulates Industry R&D Investment
ATP Funding for Energy Research
ATP and the States
ATP Supports Small Businesses
ATP and University Participation
How Small is a "Small" Firm in ATP?
Does Size of "Small" Firm Affect Type of Project Participation in ATP?
Has the Size of "Small" Firms in ATP Changed Over Time?
ATP's Investment in Component-Based Software Technology
Technology Adoption Indicators Help Determine the Likelihood of Technology Adoption
Flow Control Machining Technology Enables Economic and Environmental Benefits

ATP Promotes and Speeds Up Development of High Risk Technology
ATP Helps Bridge Gap Left by Venture Capitalists
ATP Award Important for Early Stage Technology Development
ATP Accelerates Technology Development
ATP Collaboration and Related Programs
Time to Commercialization Differs Across Technologies
Diffusion Pathways for ATP-Funded Photonics Technologies
ATP Award Leads to "Halo" Effect and Pursuit of R&D in the Public Interest
ATP Helps Firms Build New Capabilities and a Broader Social Network for Innovation
ATP Award Addresses Capital Market Inefficiencies for Developing Early Stage Technologies
Determinants of Success in ATP-Funded R&D Joint Ventures
Participation in ATP-Funded Research Consortia Increases Patenting Activity
Bringing Benefits of Digital Mammography and Radiography to More People

ATP Improves Quality of Life

ATP's Investment Return to the Nation
ATP Improves Your Health and Quality of Life
ATP Partners with NIH to Accelerate the Human Genome Project
ATP-Funded Research Promises Improved Food Safety and Quality

ATP Award Statistics

Characteristics of ATP Award Winners
Distribution of Funding Among ATP Awards
ATP Performance Measures

Appendix 2

List of ATP Awards
Calendar 2002 and 2003

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
4Wave Inc. Sterling, VA	Trey Middleton 703-787-9283 X 100	$1,969,725	$2,767,000	1/1/2003
Development of a Four-Channel Miniature Optical Filter Chip Prototype a new semiconductor fabrication technology, Biased Target Ion Beam Deposition (BTIBD), and prove its effectiveness by designing and developing a novel four channel optical communications "multi-filter chip" that may reduce the cost of current four channel filter solutions by 80 percent.				
ActivEye, Inc. Pleasantville, NY	Carolyn C. Ramsey 914-882-8087	$1,868,275	$2,804,853	1/1/2003
Active Alert for Video Monitoring Develop an automated security surveillance system that combines closed circuit video cameras, radio-frequency identification technology, and computer modeling and analysis of human behaviors, with the aim of achieving rapid, reliable detection of suspicious events warranting the attention of security personnel.				
Actuality Systems, Inc. Burlington, MA	Christina Guilbert 781-759-0015	$1,666,468	$2,085,278	1/1/2003
Spectrally-Multiplexed Holographic Video Advance holographic visualization technology from still images to full-motion full color images suitable for use in scientific visualization, medical evaluation, and entertainment by overcoming challenges related to image resolution, data processing, and consumer-level pricing.				
Acuitus, Inc. Palo Alto, CA	Maria Machado 650-833-5710	$2,000,000	$2,273,905	1/1/2003
Two Sigma Math Tutor Develop an intelligent tutoring system that models expert tutor behavior as well as what the tutor is observing about the student to create a computer-based effective teacher's aid that complements teacher-led classroom instruction.				
AdvanTek International, LLC Boothwyn, PA	Steven R. Kopf 484-490-1104	$2,000,000	$4,206,938	1/1/2003
Development and Validation of Instantaneous Power-Control Technology for Utility-Scale Wind Turbines Develop a rotor technology that allows blades to be 30 percent longer without increasing structural and fatigue loads, improves wind turbine output by 25 percent, and makes wind farms cost effective in moderate-wind regions.				
Agility Communications Santa Barbara, CA	Heidi Groshelle 415-563-1893	$1,999,761	$3,004,000	1/1/2003
40 Gb/s Widely Tunable Photonic Integrated Transmitter Develop a photonic integrated circuit that integrates a widely tunable laser, an optical amplifier, and a high-speed optical modulator, dramatically cutting costs for tunable transmitters widely used in Internet data systems.				

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
Agiltron, Inc. Woburn, MA Other participants: • AC Photonics, Inc. Santa Clara, CA	Dr. Jack Salerno 978-694-1006 X 11	$3,500,000	$7,000,666	1/1/2003
Next-Generation Optical Network Switch Develop a new type of optical switch, based on a revolutionary optical MEMS platform, that is more efficient, more reliable, and faster, helping to revitalize the broadband telecommunications industry.				
Alumina Micro LLC Bellingham, WA	Jeff Chancey (360) 734-8220	$2,000,000	$2,539,011	3/1/2002
Pressure-Balanced Plate Type Microvalve Applied to High-Pressure, High Flow Fluidic Systems Develop a novel micro electro-mechanical (MEMS) microvalve technology for controlling the flow of liquids, mists, and gases at high pressures and flow rates for use in the automotive industry and other applications.				
American Superconductor Westborough, MA	Jeff Nestel-Patt 508-621-4375	$2,000,000	$6,130,738	3/1/2002
Advanced Thermal Processing and Equipment for Wide-Web YBCO Coated Conductor Composite Wire Design, construct, and test innovative thermal processing equipment for the low-cost manufacturing of high-temperature superconducting wire with a price/performance ratio superior to that of copper.				
Aqua Bounty Farms, Inc. Waltham , MA	Joseph McGonigle 781-899-7755	$1,680,000	$3,554,513	1/1/2003
Developing Reversible Sterilization in Fish to Eliminate Genetic and Environmental Risk Develop technology to produce sterile transgenic fish that can be made fertile as needed for reproduction.				
Ardais Corporation Lexington, MA	Marcia Kean 781-698-0189	$1,957,425	$3,585,816	3/1/2002
A Medical Informatics Data Model, Software Development Toolkit and Applications to Enable the Use of Clinical Information in Genomic-based Pharmaceutical Research Develop and test software technologies to help researchers understand the molecular basis of disease and select the most clinically relevant targets earlier in the drug development process.				
Astronautics Corporation of America Milwaukee, WI	Holly Russek 414-449-4123	$1,660,170	$4,254,286	1/1/2003
Active Magnetic Regenerator Refrigeraton Design, build, and test a magnetic refrigerator that is energy efficient, cost effective, and environmentally safe.				

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
AstroPower, Inc. Newark, DE Other participants: • Dow Corning Midland, MI • Crystal Systems, Inc. Salem, MA	Colleen Gourley 302-366-0400 X 2025	$5,515,975	$11,301,473	1/1/2003
New Routes to Ultra-Low-Cost Solar-Grade Silicon for Renewable Energy Generation Develop industrial refining processes to produce low-cost, high-purity silicon feedstock in virtually unlimited commercial quantities for the solar cell industry.				
BH Electronics, Inc. Burnsville, MN	Richard H. Jackson 952-894-9590	$695,458	$786,388	1/1/2003
Ultraminiature Transformer and Inductor Design and Manufacture Develop technology for low-cost mass-manufacture of high-frequency electronic transformers and inductors, enabling U.S. production of these commodity components, most of which are now hand manufactured and imported.				
Bit 9, Inc. Somerville, MA	Dr. Todd Brennan 617-491-1768	$2,000,000	$2,529,315	1/1/2003
Computer Immune System Develop a system that will proactively protect computers and networks from attack, even if the virus or attack is unknown, as opposed to current protection systems that can react only to known threats.				
BRAINSTORM Technology LLC New York, NY	Ann Clements 212-807-0999	$2,000,000	$2,120,000	1/1/2003
Integration of 3-D Photography for Photorealistic Modeling in Construction and Disaster Recovery Develop software that creates accurate, realistic, three-dimensional models of buildings and other large-scale environments for applications in construction, disaster recovery, architecture, urban planning, preservation, and entertainment.				
Cabot Corporation (formerly Superior MicroPowders, LLC) Albuquerque, NM	Mark Hampden-Smith (505) 342-1492	$1,984,165	$3,201,953	3/1/2002
Development of High Volume Digital Manufacturing of Membrane Electrode Assemblies for Fuel Cells Design and demonstrate direct methanol fuel cells composed of low-cost membrane electrode assemblies enabled by digital ink-jet printing of catalysts with low precious-metal content.				
Cabot Corporation (formerly Superior MicroPowders, LLC) Albuquerque, NM	Mark Hampden-Smith (505) 342-1492	$2,000,000	$3,071,771	3/1/2002
Elevated-Temperature, Reformate-Tolerant Membrane Electrode Assemblies (MEAs) for Polymer Electrolyte Fuel Cells Develop and prototype novel membrane and catalyst deposition technologies to enable continuous production of polymer electrolyte fuel cells that operate at elevated temperatures and can use simpler fuel processors and cheaper, low-purity fuels.				

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
Caterpillar, Inc. Peoria, IL	Carl M. Volz 309-675-5819	$4,417,479	$8,890,844	3/1/2002
Structural Health Integrated Electronic Life Determination (SHIELD) System Develop and demonstrate prototype sensor and analysis technologies for determining in real time the condition and remaining functional life of large metal equipment and/or structures.				
Center for Automotive Research (CAR) Ann Arbor, MI Other participants: • Altarum Institute Ann Arbor, MI • General Motors Corporation Troy, MI • Sekely Industries Salem, OH • Ford Motor Company Dearborn, MI • ComauPICO Southfield, MI • American Tooling Center Grass Lake, MI • Atlas Tool, Inc. Roseville, MI • Autodie International Grand Rapids, MI • CogniTens Wixom, MI • EDS Troy, MI • Riviera Tool Grand Rapids, MI • Thunder Bay Pattern Works Clinton Twp, MI • Perceptron, Inc. Plymouth, MI	Heather Grisham 734-929-0472	$5,286,000	$10,827,208	1/1/2003
Building a Virtual Auto Body: The Digital Body Development System Develop a decision support software system that will integrate the virtual building of an automobile body structure with functional build decision making software to help designers, engineers, and vehicle launch teams solve problems and predict how solutions will affect quality, cost, and schedule.				
Chesapeake PERL, Inc. College Park, MD	Ms. Terry Chase 301-405-0207	$2,000,000	$2,620,000	1/1/2003
Debugging Protein Glycosylation for Biotherapeutics Genetically transform caterpillars to produce therapeutic protein drugs 100 times faster than any current technology, decreasing drug development costs and increasing affordable drug production capacity.				

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Chicago PT, Inc. Evanston, IL	Michael Peshkin 847-491-4630	$1,501,626	$1,814,626	1/1/2003
Kine-assist for Physical Therapists Develop and demonstrate a prototype robotic tool, the kine-assist, that will enable physical therapists to deliver more intensive and effective rehabilitation therapy to stroke patients.				
Chiral Photonics, Inc. Clifton, NJ	Dan Neugroschl 973-594-8888 X 102	$2,000,000	$2,847,041	1/1/2003
Development of Chiral Grating Technology for Advanced Fiber Laser Develop and prototype a new type of low-cost laser--one that operates inside the glass fiber used for optical communications--potentially leading to dramatic telecommunications system cost reductions.				
Chromatin, Inc. Chicago, IL	Mich Hein 312-455-1853 X10	$1,967,632	$3,795,321	1/1/2003
Multi-Gene Mini-Chromosomes for Gene Delivery into Plants Develop mini-chromosome technology for simultaneous introduction of multiple genes into plants to produce improved crops for agricultural, industrial, and pharmaceutical products.				
CINEA, Inc. Herndon, VA	Laurence Roth 571-323-0070 X 1	$2,000,000	$2,347,603	3/1/2002
Content Specific Camcorder Jamming for Digital Projectors Develop and test prototype technology for distorting unauthorized recordings of digital movies made during theater showings without affecting human visual perception of the original version.				
CombineNet, Inc. Pittsburgh, PA	Tuomas Sandholm (412) 654-5994	$1,836,530	$1,905,400	3/1/2002
Scalable and Usable Technology for Markets with Expressive Bidding Develop software to support complex, large-scale, on-line auctions featuring combinatorial exchanges where bidders can specify particular packages of items to bid on with various “side constraints,” maximizing value for all parties in the exchange.				
Conclusive Technology, Inc. Vienna, VA	Matthew McKennirey 703-734-3000	$434,176	$455,176	3/1/2002
XML Encryption in Native XML Database Develop a prototype for a new data security model for the Internet, including the management of encryption keys and of user access to the data, that operates at the level of individual data elements within a database, which may be permanently encrypted in transit and in storage in the database.				
Corning IntelliSense Corporation Wilmington, MA	Allison Kurz 978-988-8000 X 2229	$1,999,705	$5,665,920	3/1/2002
Ultrahigh Density Scalable Digital Control of Microelectromechanical Systems To develop high-density digital control and interfacing schemes for microelectromechanical systems (MEMS) -- making imprecise devices precise.				

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Dimensional Control Systems, Inc. Troy, MI	Ramesh Kumar 248-269-9777 X 214	$1,987,927	$2,837,181	1/1/2003
SOVA: Stream-of-Variation Analysis System for Multistage Assembly Processes Develop a widely applicable computer simulation system for modeling, analyzing, predicting, and optimizing the performance of multistage manufacturing processes requiring accurate parts alignment to improve production and product quality.				
Eksigent Technologies, LLC Livermore, CA	Don W. Arnold 925-960-8869 X 302	$2,000,000	$3,197,949	1/1/2003
HPLC-On-A-Chip For High Throughput Chemical Analysis Develop a miniaturized, high-performance liquid chromatography system on a chip that will accelerate the screening of drug candidates before clinical trials and greatly reduce the costs of drug discovery and development.				
Energy Conversion Devices, Inc. Rochester Hills, MI	Ghazaleh Koefod 248-293-0440	$1,972,246	$3,257,157	1/1/2003
Phase Change Optical Routers Develop advanced Ovonic TM phase change materials and use them to create a fast optical switch for telecommunications--offering submicrosecond switching speeds--so fast that optical packet switching could become viable, eliminating the very costly, repetitive, and slow conversion of fiber optic light signals to and from electronic signals.				
eSpin Technologies, Inc. Chattanooga, TN	Dr. Jayesh Doshi 423-267-6266	$1,996,946	$2,484,856	3/1/2002
Prototype High-Throughput Electrospinning Process and Applications of Electrospun NanoFibers Design, build, and demonstrate a high-speed machine for low-cost electrospinning of polymeric nanofiber mats for industrial, military, consumer, health care, and environmental applications.				
Ford Motor Company Dearborn, MI Other participants: • Sonobond Ultrasonics, Inc. West Chester, PA • Edison Welding Institute (EWI) Columbus, OH • American Technology, Inc. Danbury, CT	Kay Milewski 313-248-8196	$4,395,000	$8,910,000	1/1/2003
Ultrasonic Metal Welding - Enabling the All Aluminum Vehicle Develop ultrasonic metal welding technology for the mass production of aluminum automobile bodies to improve vehicle fuel economy.				
Gene Check, Inc. Ft. Collins, CO	Dr. Robert E. Wagner 970-472-9951	$1,762,178	$1,915,468	1/1/2003
High Throughput, Low Cost SNP Genotyping for Diagnostics and Genome Scanning Develop a method for accurate simultaneous detection of up to 100,000 single nucleotide polymorphisms, or point mutations, in patient DNA, enabling rapid, low-cost genotyping, for disease diagnosis, susceptibility testing, and personalized medicine.				

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Gene Network Sciences, Inc. Ithaca, NY	Debbie Pfiefer 206-282-5098	$2,000,000	$3,349,763	3/1/2002
Cost-Effective Detection of Efficacious and Non-Toxic Drug Targets via Breakthrough in Silico Methods Develop and validate software that creates dynamic, predictive simulations of normal and cancerous cells with up to 10,000 cell components as a means of rapidly identifying targets for new, non-toxic drugs.				
General Electric Company Niskayuna, NY Other participants: • Energy Conversion Devices, Inc. Rochester Hills, MI	James Healy 518-387-6284	$6,426,607	$13,061,008	1/1/2003
Roll-to-Roll Processing to Enable the Organic-Electronics Revolution Revolutionize the electronics industry by developing low-cost roll-to-roll printing technologies, not for newspapers, but for roll-to-roll printing of large area electronic devices, potentially enabling flexible displays, ubiquitous embedded sensors, and high-efficiency lighting products.				
General Electric Company Schenectady, NY Other participants: • Molecular Nanosystems, Inc. Palo Alto, CA	Jim Healy 518-387-6284	$2,833,996	$5,783,668	3/1/2002
Template Synthesis Platform for Nanostructured Materials Develop and demonstrate the use of a technology platform for precisely controlled growth of nanomaterials designed for applications in medical imaging systems, fluorescent lamps, and flat-panel displays.				
GE Global Research Niskayuna, NY Other participants: • Native American Technologies Golden, CO • Columbia University New York, NY • A. Zahner Company, Inc. Kansas City, MO • Caterpillar, Inc. Peoria, IL	Jim Healy 518-387-6284	$3,499,804	$6,999,612	3/1/2002
Laser Forming of Complex Structures Develop technologies for a controllable, repeatable laser forming process that can make and repair a wide range of complex sheet-metal, tubular, and duct-like parts meeting specific requirements.				

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General Electric Company Niskayuna, NY Other participants: • Cabot Corporation (formerly Superior MicroPowders, LLC) Albuquerque, NM • State University of New York (SUNY) at Binghamton Binghamton, NY	James Healy 518-387-6284	$3,506,139	$7,267,520	3/1/2002
Nanoengineered Thermal Interfaces Enabling Next Generation Microelectronics Develop and demonstrate the performance of novel materials, for use as interfaces between computer chips and heat sinks, that conduct heat 10 times better than today's interface materials.				
Genex Technologies, Inc. Kensington, MD	Patrick May 301-962-6565 X 104	$1,999,999	$2,829,535	3/1/2002
Expanding Facial Recognition Capability with Novel 3D Imaging Technologies Develop a comprehensive hardware and software system that captures, stores, and matches facial images in three dimensions to achieve rapid, accurate, cost-effective face recognition despite variations in lighting, distance, pose, expression, and age.				
Glycofi, Inc. Lebanon, NH	Dr. Charles E. Hutchinson 603-643-8186 X 103	$2,000,000	$6,384,076	3/1/2002
Production of Therapeutic Proteins Through Metabolic Engineering of Yeast Genetically engineer yeast to add sugars to proteins in a "human-like" rather than "yeast-like" pattern, creating a platform technology for large-scale, low-cost production of therapeutic proteins.				
Gryphon Therapeutics South San Francisco, CA	Alexander R. Lussow 650-360-1434	$2,000,000	$3,247,869	1/1/2003
Novel Technology for the Discovery of D-Peptide Therapeutics for Cytokine-Mediated Diseases Develop an approach for discovering D-peptide drugs, a new class of therapeutics likely to be pharmacologically superior to monoclonal antibody drugs and less immunogenic.				
GSE, Inc. Incline Village, NV	Greg Stevenson 775-831-3917	$2,000,000	$3,000,000	3/1/2002
Multi-Fuel General Aviation Piston Engine Design, build, and test a reliable, high-performance piston (diesel) aircraft engine that overcomes the high combustion knock and high wear rates typical of today's diesel engines when operated with Jet-A and similar fuels.				
HandyLab, Inc. Ann Arbor, MI	Sanjeeb Das 734-663-4719 X 225	$2,000,000	$2,500,000	1/1/2003
Portable DNA Analysis Device Using Real-Time PCR and On-Chip Electrochemical Detection Develop a highly sensitive, low-cost, and portable DNA analysis device using electrochemical detection of real-time polymerase chain reaction (PCR) instead of a fluorescence detection scheme.				
Haptic Technologies, Inc. West Newton, MA	Dr. Mandayam Srinivasan 617-332-0539	$1,994,600	$2,214,600	1/1/2003

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
Virtual Reality Based Surgical Simulation and Training System Develop a virtual reality surgical simulation system for the training of surgeons through conveyance of realistic touch and force sensations back to the student coupled with realistic views, dynamically updated in real-time, of tissue and organs and their deformation when cut or probed with virtual surgical tools.				
Imaging Systems Technology Toledo, OH	Vicki Kurtz 419-536-5741	$1,999,192	$2,861,868	1/1/2003
Low-Cost Flexible Plasma Displays Develop a novel plasma display panel structure that uses hollow glass microspheres containing ultrapure ionizable gas as the addressable pixel elements, uses a flexible substrate, and substantially lowers the cost of displays.				
Imaging Therapeutics, Inc. (formerly OsteoNet, Inc.) Menlo Park, CA	Dr. Barry J. Linder (650) 286-4151	$1,997,613	$2,756,706	3/1/2002
Novel Low-Cost Techniques for Diagnosis and Management of Patients with Osteoporosis Develop the technology for analyzing mandibular bone micro-architecture, using a network-based service, to provide accurate, widely accessible, low-cost detection and management of patients with osteoporosis.				
Imation Corporation Oakdale, MN Other Participants: • Peregrine Recording Technology Inc. Woodbury, MN • Advanced MicroSensors, Inc. Shrewsbury, MA • Read-Rite Corporation Freemont, CA • Advanced Research Corporation Minneapolis, MN • Accutronics, Inc. Littleton, CO	Richard Jewett 651-704-5276	$11,943,763	$24,128,819	3/1/2002
Multi-Terabyte Tape Storage Develop the technologies to increase the data density of existing magnetic tape data systems by a factor of 250 and lay the foundation for even greater densities in future systems, leading to cost reductions in data archiving and improving the competitive position of the U.S. data storage industry.				
Infrared Identification Inc. Lorton, VA	Larry Lotspeich 703-838-8420	$1,995,162	$2,236,006	1/1/2003
THE NEXT GENERATION BIOMETRIC--Infrared Identification: Accurate, Fast, Scalable, and Secure Develop a technology for biometric recognition of faces that uses thermal infrared imaging to map unique vascular patterns, operates in real time, identifies anyone whose infrared or visual image is recorded in its database, and is invulnerable to forgery, disguise, and varying environmental conditions.				

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InPhase Technologies, Inc. Longmont, CO	Dr. Lisa Dhar 720-494-7422	$2,000,000	$2,832,000	3/1/2002
High Performance Rewriteable Recording Media for Holographic Data Storage Develop and demonstrate the use of rewriteable recording materials for holographic data storage systems that offer ultrahigh storage density and data access rates and can be reused up to 1,000 times.				
InPhase Technologies, Inc. Longmont, CO Other Participants: • Displaytech, Inc. Longmont, CO	Liz Murphy 720-494-7465	$2,769,159	$5,716,501	1/1/2003
Technologies for Advanced Holographic Data Storage Create a prototype optical data storage device that proves the viability of using holographic 3D techniques--enabling parallel reading and writing of data with a 10 times faster rate than standard technologies--potentially helping the United States reclaim leadership in optical data storage.				
InRAD, L.L.C. Knoxville, TN	Richard Neal 865-947-7000	$1,996,181	$2,372,029	1/1/2003
Automated Knowledge Discovery System (AKDS) Develop an automated software system to search for and organize content from Internet sites and databases that precisely matches a user's information requirements, thereby expediting research and development and reducing research costs.				
Integrated Fuel Cell Technologies, Inc. Bedord, MA	Jim Daniell 781-271-1343	$1,920,000	$3,814,618	1/1/2003
High Density, Scalable, Mass-Manufacturable Semiconductor Fuel Cell Pursue semiconductor fabrication methods for high volume manufacture of Proton Exchange Membrane (PEM) fuel cell cores, leading to a family of low-cost fuel cell systems ranging from 1 Watt to over 10kW, potentially giving the United States a dramatic lead in fuel cell production and replacing millions of imported batteries.				
Integrated Sensing Systems, Inc. Ypsilanti, MI	Kim Ray 734-547-9896 X 100	$1,973,972	$2,673,792	1/1/2003
Multi-Drug, Portable Infusion System for the Treatment of Cancer and AIDS Develop a highly portable multidrug infusion system that integrates the technology of microelectromechanical systems with a passively pressurized drug reservoir, thereby dramatically improving control of drug delivery, while operating on low power.				
Iomai Corporation Gaithersburg, MD	Dr. Diane Epperson 301-556-4500	$1,998,810	$3,467,618	3/1/2002
Development of a Broad Platform Immunostimulatory Cancer Vaccine Develop a cancer immunotherapeutic vaccine that effectively triggers the immune system to overcome barriers currently preventing other approaches from aggressively killing cancer cells.				

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ISCA Technologies, Inc. Riverside, CA	Dr. Agenor Mafra-Neto 909-686-5008	$2,000,000	$2,717,693	3/1/2002
Autonomous Pest Monitoring and Control System Integrate recent advances in insect behavior manipulation and information technology with sensor technologies in an highly automated pest management program that drastically reduce the use and misuse of environmentally damaging pesticides.				
ISOGENIS, Inc. Denver, CO	John R. Price 303-886-0700	$1,998,903	$2,154,983	1/1/2003
Immune System Evading Targeted Gene Therapy Vectors Develop gene therapy vectors that both cure disease and prevent harmful immune response against the therapy, as well as develop a system to selectively deliver the vectors to the diseased tissues.				
Kosan Biosciences Hayward, CA	Michael S. Ostrach 510-732-8400 X 207	$2,000,000	$4,500,000	3/1/2002
De Novo Assembly of Polyketide Synthases by Combinatorial Biosynthesis Identify and demonstrate rational techniques for constructing gene-based enzymatic assembly lines for producing natural and engineered polyketide products that could be useful pharmaceuticals.				
Large Scale Biology Corporation Vacaville, CA	Dr. Alison McCormick 707-469-2384	$1,999,934	$4,645,934	3/1/2002
Novel Plant Produced Virus-Like Particles for the Delivery of Rapid and Effective Vaccines Develop a new vaccine platform that utilizes plants to more efficiently and safely produce vaccines for use in treating infectious diseases, cancer, and rheumatic diseases.				
Libraria, Inc. San Jose, CA	Debra Bannister 530-676-8001	$1,971,990	$2,674,738	3/1/2002
Chemical Intelligence Platform for Rapid Discovery of Drugs Leads Develop an integrated suite of software tools that combine software prediction, empirical laboratory testing, and human intuitive input to accelerate the identification -- and improve the quality -- of candidate pharmaceuticals.				
Lillputian Systems, Inc. Woburn, MA	Dr. Aleksander Franz 781-935-9777	$2,000,000	$3,516,436	3/1/2002
Micro Solid Oxide Fuel Based Power Supplies for Handheld Electronics Develop and demonstrate a prototype high-temperature “fuel cell on a chip” yielding an energy-to-volume ratio (or run time) 5-10 times better than the leading battery technology for use in handheld electronic devices.				
Luxtera, Inc. Pasadena, CA	Alex Dickinson 626-396-0380 X 108	$1,999,960	$4,193,688	3/1/2002
Nanophotonic Integrated Circuits for Telecommunications and Computing Design, fabricate, and demonstrate the performance of nanophotonic circuits integrated on semiconductor wafers using standard semiconductor processing equipment.				
Medaxis Corporation Los Angeles, CA	Sia Yaghmai 310-443-0606 X 222	$1,974,794	$2,136,092	1/1/2003

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A Distributed Information Architecture for Clinical Practice and Medical Research Develop a software architecture for physicians and researchers that automatically extracts patient data from electronic medical records - regardless of location, database, or computer code - generates a list of patient problems, and displays information in ways that support diagnostic and therapeutic decisionmaking.				
Metabolix, Inc. Cambridge, MA	Oliver Peoples 617-492-0505 X 212	$1,640,868	$3,282,236	1/1/2003
Industrial Genome Engineering Reengineer the central metabolism of E. coli bacteria and demonstrate that the new strains efficiently convert renewable sugars into high-performance biodegradable polymers.				
Micro Magnetics, Inc. Fall River, MA	Gurpreet Singh 508-910-9842	$2,000,000	$3,406,744	1/1/2003
Spintronics-Based High-Resolution, Non-Invasive, and Ultrafast Metrology for the Semiconductor Industry Develop a nanoscale magnetic tunnel junction current-sensing system for integrated circuit inspection that will help maintain the U.S. lead in semiconductors by providing vastly improved metrology for in-process inspection.				
Mirus Corporation Madison, WI	David Lewis 608- 441-2858	$2,000,000	$2,927,040	3/1/2002
Utilization of Small Interfering RNAs for Drug Target Validation In Vitro and In Vivo Develop and demonstrate technology for the validation of drug targets (proteins) in vitro and in vivo by inhibiting the production of those proteins through the degradation of intermediate molecules (messenger RNA).				
mVerify Corporation (formerly Mobile Systems Verification Corporation)	Robert V. Binder 312-342-0003	$1,934,551	$2,054,551	1/1/2003
The Advanced Mobile Application Testing Environment Develop next-generation automated testing technology to improve mobile information system reliability.				
Motorola, Inc., Motorola Labs Other participants: • Englehard Corporation Iselin, NJ	Anne Stuessy 847-538-6192	$2,318,781	$4,732,207	1/1/2003
Hydrogen Generator for a Miniature Fuel-Cell Power Source Develop a miniature catalyst fuel processor that will provide high energy density and higher power for a wide range of fuel cell-based portable power applications.				
NanoMatrix, Inc. Dallas, TX	Peter J. Stevens 972- 751-0382	$1,982,500	$2,593,500	3/1/2002
Living Vascular Implant Develop materials, processes, and other technologies for fabricating three-dimensional collagen matrix scaffolds that can be seeded with various types of cells to mimic natural, small-diameter blood vessels				
Neah Power Systems, Inc. Bothell, WA	Gregg Makuch 425-482-0654 X 104	$2,000,000	$6,566,000	1/1/2003

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
Porous Silicon Electrode All Liquid Fuel Cells Develop a miniature direct methanol fuel cell using novel porous silicon electrodes and microfluidics for handling fuel and oxidant, potentially replacing environmentally challenging rechargable batteries while offering longer run times, higher power output, and instantaneous recharging for portable electronic devices.				
Neocera, Inc. Beltsville, MD	Andrew Schwartz 301-210-1010 X 143	$1,968,348	$3,378,801	3/1/2002
Advanced Technology for Non-destructive, Localized, Dielectric Metrology of Future Generation Integrated Circuits Develop microwave metrology technology for quantitative in-situ characterization of materials with low dielectric constants at length scales and frequencies appropriate to future integrated circuit designs.				
NeuroPace, Inc. Mountain View, CA	Rebecca Kuhn 650-237-2739	$2,000,000	$3,033,623	1/1/2003
Preemptive Brain Stimulation Technology For Treating Epilepsy Develop preemptive stimulation technology for use in an implantable neurostimulator that normalizes brain activity and reduces the likelihood and severity of epileptic seizures.				
Newport Sensors, Inc. Irvine, CA	Dr. Maria Q. Feng 949-378-8666	$1,991,512	$2,300,126	1/1/2003
Microwave Imaging Technology for Condition Assessment of FRP Composites Develop a portable device that uses microwave imaging technology to assess the condition of reinforced-concrete structures, such as bridge columns, that have been strengthened or repaired with fiber-reinforced polymer composite materials.				
NexTech Materials Lewis City, OH	William J. Dawson 614-842-6606	$2,000,000	$2,245,519	3/1/2002
Direct Fuel Power Module Develop a low-cost fuel cell module made by thin film fabrication that operates directly on hydrocarbon fuels without additional fuel processing, offers high volumetric power efficiency, and is scalable for applications requiring from 5 watts to 5 kilowatts.				
Ohio Aerospace Institute Brookpark, OH Other Participants: • Parallax Power Components, L.L.C., Capacitor Division New Bedford, MA • Case Western Reserve University Cleveland, OH • DuPont Teijin Films U.S. Limited Partnership Circleville, OH • Lithium Power Technologies, Inc. Manvel, TX	Laurie Beringer 440-962-3114	$2,547,730	$5,242,242	1/1/2003

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
New Polymer Dielectrics for High Energy Density Film Capacitors Develop thin-film, plastic dielectric materials that will enhance current capacitor performance 10-fold, leading to development of smaller, lighter, more portable electrical equipment including power converters for fuel cells and electric vehicles.				
Osiris Therapeutics, Inc. Baltimore, MD	Mark F. Pittenger 410-522-5005 X 237	$2,000,000	$3,226,325	3/1/2002
Neural Regeneration with Mesenchymal Stem Cells Demonstrate the feasibility of using human mesenchymal stem cells from adult bone marrow to regenerate neural tissue as a basis for improving treatments for spinal cord injuries and stroke.				
Owens Corning Tallmadge, OH	Patrick Rynd 330-633-6735 X 219	$1,900,000	$4,750,000	3/1/2002
Environmentally Benign Micro-Cellular Nano-Composite Foam for Structural and Insulation Market Develop advanced micro-cellular, nanocomposite rigid foam building materials with much higher structural strength and thermal insulation performance of existing materials, using environmentally benign blowing agents to replace HCFCs.				
Palo Alto Research Center Palo Alto, CA	Tracy Kugelman 650-812-4085	$1,657,696	$4,144,240	1/1/2003
Building for Radical Interoperation Develop a novel interconnection technology that permits a wide variety of digital devices and services to interoperate without pre-installing driver software.				
Paradigm Genetics, Inc. Other participants: • Lion Bioscience (formerly NetGenics, Inc.) Cambridge, MA	Melissa Matson 919-425-3725	$11,768,672	$23,584,513	3/1/2002
Technologies for Target Assessment Develop robust software and database technologies that can be used to identify gene function and associated leads for new pharmaceutical and chemical products rapidly, reliably, and efficiently.				
Piezotech, LLC Indianapolis, IN	Michael H. Phillips 765-483-2550	$2,000,000	$2,539,533	3/1/2002
Development of High Power Piezoelectric Ceramics and Novel Ultrasound Therapeutic Devices for Minimally Invasive Surgery Design, develop, and test new piezoelectric ceramic materials and miniature high-power ultrasound arrays that can be used to destroy diseased tissues inside body cavities.				
Plug Power Inc. Latham, NY	Cynthia Mahoney White 518-782-7700 X 1973	$1,879,586	$3,853,543	1/1/2003
Low Cost Fuel Cell System Technologies Development Develop four technologies - a power-control system that uses digital signal processing, a carbon nanotube hybrid electrode for superior stack performance, hydrogen pumping for coping with sporadic demands for high power, and electroimpedance spectroscopy for humidity management - that reduce the cost of fuel-cell-produced energy to levels competitive with power grids, thus stimulating much wider use of fuel cells.				

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PolyFuel, Inc. Mountain View, CA	Christian DeNikex Mountain View, CA	$2,000,000	$2,789,165	1/1/2003
Novel Fabrication Process for Gas Diffusion Layers Needed in Fuel Cells Develop a low-cost, high-speed process for fabricating gas diffusion layers for use in fuel cells improving their performance and spurring wider use.				
PowerSicel, Inc. Boulder, CO	John Torvik 303-442-4250	$1,989,783	$2,989,783	1/1/2003
High Performance Transistors for Broadband Wireless Communications Develop new high-performance power transistors operating at 10 times the power density and five times the efficiency of conventional power transistors, enabling true broadband ultralinear power amplifiers.				
Prediction Sciences, LLC. San Diego, CA	Cornelius Diamond 619-255-8730	$2,000,000	$3,156,280	3/1/2002
Pharmacogenomic Prediction Drug Therapy Develop and test models and information processing techniques for decision-support tools that will enable physicians to predict drug reactions and tailor dosage ranges based on a patient's individual characteristics.				
Quantum Signal, LLC Ann Arbor, MI	Dr. Mitchell M. Rohde 734-994-0028	$1,838,970	$1,930,918	3/1/2002
Robust, Multi-Modal Biometric Algorithm Technology Develop and test signal processing techniques that accommodate normal variations in individuals and data collection to achieve 90 percent accurate biometric authentication of identity through face or voice recognition.				
Raindrop Geomagic, Inc. Research Triangle Park, NC	Ping Fu 919-474-0124	$2,000,000	$3,234,120	1/1/2003
Automated Whole Part Inspection for Manufacturing Process Control Develop an automated computer-aided inspection system that uses noncontact three-dimensional laser scanning and software to measure manufactured parts and that compares the results with corresponding specifications in computer-aided design data.				
RAPT Industries Livermore, CA	Peter S. Fiske, Ph.D. 925-371-7278	$1,950,000	$3,512,442	1/1/2003
Reactive Atom Plasma (RAP) Processing-A Novel Process for Rapid Optics Fabrication Extend the capabilities of reactive atom plasma (RAP) processing so that it can be used to rapidly shape and polish delicate optical and semiconductor materials without damaging them.				
Reactive NanoTechnologies, Inc. Hunt Valley, MD	Michael Choi 410-771-9801 X 104	$1,900,000	$2,767,884	1/1/2003
Mechanical Patterning of Nanostructured Foils for Reactive Joining: Enhancing Stability with Novel Processing and Nanoengineering Develop a new class of reactive foils that can rapidly join thermally sensitive or dissimilar materials, that are stable enough to allow patterning by mechanical punching or stamping, and that promise substantial gains in productivity for U.S. manufacturers.				

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
Revivicor, Inc. (formerly PPL Therapeutics, Inc.), Blacksburg, VA	David Ayares 540-961-5559	$1,968,290	$2,657,192	1/1/2003
Preventing Porcine Endogenous Retrovirus Transmission in Xenograft Tissues Develop a technology for producing safer xenograft tissues by developing donor pigs that are incapable of replicating or propagating porcine endogenous retrovirus (PERV) or its derivatives.				
RWE Schott Solar, Inc. (formerly ASE Americas Inc.) Billerica, MA	Dr. Juris Kalejs 978-947-5993	$1,877,578	$5,557,100	3/1/2002
Continuous Silicon Wafer Manufacturing Develop a manufacturing technology for making low-cost, high-strength photovoltaic silicon wafers that integrates crystal growing and wafer cutting, operates continuously, and uses readily available silicon feedstock.				
Robert Bosch Corp. Research and Technology Center Palo Alto, CA Other participants: • SRI International, Speech Technology and Research Laboratory Menlo Park, CA • Stanford University, Board of Trustees of the Leland Stanford Junior University Stanford, CA • Volkswagen Of America, Inc, Electronic Research Laboratory Palo Alto, CA	Hauke Schmidt 650-320-2930	$2,921,291	$5,843,182	1/1/2003
Driving your Car with Conversational Language: A Next Generation Dialog System for the Convenient and Safe Operation of In-Car Devices and Services Develop an interactive natural-language dialogue system that operates various in-car devices through conversational speech, thus making driving easier and safer.				
Rosetta-Wireless Corporation Oakbrook Terrace, IL	C. Keith Campbell 630-561-0410	$2,000,000	$2,391,080	1/1/2003
Wireless Replication of Enterprise Data for Instant Access by Mobile Workers Develop a wallet-sized, wireless server for America's mobile workforce that will provide medical, sales, and service personnel with secure, instant access to all e-mail and automatically updated data files, everywhere.				
Sarnoff Corporation Princeton, NJ Other participants: • DuPont Wilmington, DE	Tom Lento 609-734-3178	$5,734,114	$11,489,147	3/1/2002
Printed Organic Transistors on Plastic for Electronic Displays and Circuits Develop and demonstrate printable organic electronic materials and fabrication technologies for the production of thin film transistors on plastic substrates for use in low-cost displays.				

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
Sarnoff Corporation Princeton, NJ Other participants: • Thomson, Inc. Princeton, NJ • SBC Technology Resources, Inc. Austin, TX • Alcatel USA Sourcing, LP Plano, TX	Thomas Lento 609-734-3178	$4,001,756	$8,043,472	1/1/2003
Video-Enhanced Residential ADSL Broadband Technology Develop broadband technology that allows video services comparable in quality to cable and satellite television to be delivered in real time over standard ADSL infrastructure.				
Sehda, Inc. Mountain View, CA	Farzad Ehsani 650- 328-8877 X 11	$1,305,751	$1,556,209	3/1/2002
A Phrase-Based Statistical Approach to Understanding and Translating Natural Language Develop and demonstrate technologies that will enable accurate machine understanding of human languages by isolating statistically significant phrases and mapping equivalencies in their usage.				
SiWave, Inc. Arcadia, CA	Roman Gutierrez 626-821-0570 X 320	$1,978,137	$4,065,743	3/1/2002
High Low Cost, Highly Scalabe Optical Switches Using Digital MEMS Mirror Arrays Develop and demonstrate a low-cost, high-capacity optical switch assembled through passive self-alignment that uses microelectromechanical system arrays of digitally controlled mirrors to route light within the switch.				
Starfire Systems Malta, NY	Steven Atmur 518-899-9336 X 102	$1,739,322	$3,826,508	3/1/2002
Ceramic Matrix Composite Boards for SOP and SIP Electronic Packaging Develop a ceramic matrix composite circuit board having the performance properties of ceramic and the processing advantages of polymer composites that can meet the demanding requirements of microminiaturized electronic systems for the next decade.				
Starthis, Inc. Arlington Heights, IL	Dr. David L. Naylor 847-375-9560	$2,000,000	$2,328,525	1/1/2003
A Service-oriented Industrial Automation Middleware for Adaptable, Reconfigurable Control Systems Develop industrial middleware that allows control engineers to design new control systems or adapt and reconfigure existing systems rapidly and intuitively, enabling agile manufacturing operations that can respond effectively to changing markets and competition.				
Stratatech Corporation Madison, WI	Paul Conrad 608-441-2750	$1,999,608	$2,646,687	1/1/2003
Technology for Room-Temperature Storage of Living Human Cells and Organs Develop and demonstrate methods to enable ice-free freezing and drying processes for room-temperature preservation and shipping of living cells, tissues, and tissue-engineered products.				

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
Supertron Technologies, Inc. Newark, NJ	Jon T. DeVries 973-639-1112 X 103	$2,000,000	$2,675,000	1/1/2003
Superconducting Magnetic Resonance Imaging (MRI) Array Coil Design, build, and test arrays of superconducting coils that will greatly improve image quality and reduce image acquisition time in magnetic resonance imaging procedures.				
Surface Logix, Inc. Brighton, MA Other participants: • Ancora Pharmaceuticals, Inc. Cambridge, MA	Dr. Stewart Campbell 617-783-8866	$6,910,846	$15,357,439	3/1/2002
Immobilized Carbohydrate-Based Drug Discovery Technologies Develop a set of highly reliable assay, solid-phase carbohydrate synthesis, and surface detection methods that will enable carbohydrate-based discovery.				
Targacept Inc. Winston Salem, NC	Dr. William Caldwell 336-480-2117	$1,871,370	$1,989,408	1/1/2003
New Software Tool for Improving Drug Discovery and Development Develop new simulation software that uses quantum mechanics to evaluate molecular forces and electronic structures in organic and biological systems to help improve the development of drugs by accurately predicting biological and toxicological effects.				
TechGuard Security, LLC Chesterfield, MO	Suzanne Magee Joyce 314-374-1676	$1,451,940	$1,669,730	1/1/2003
Artificial Intelligence to Protect the US Critical Infrastructure: A Heuristic Firewall Research Project Develop a revolutionary computer network firewall that augments conventional rule-based screening with behavior-based screening using sets of artificial neural networks to recognize malicious traffic on first attack.				
Technology Management, Inc. Cleveland, OH	Benson P. Lee 216- 541-1000	$1,770,063	$2,859,706	3/1/2002
Small, Ultra Efficient Fuel Cell Systems Design, build, and demonstrate an affordable solid oxide fuel cell (SOFC) system that offers ultra-high (70 percent) efficiency in the conversion of chemical energy to electric power in system sizes of 1 kilowatt and larger.				
Technomics, LLC Plymouth, MN	Charles H. Bergman 763- 383-4720 X 11	$2,000,000	$2,744,505	3/1/2002
Rapid Quenching of Aluminum Alloy Castings Through an In-Line Fluidized Bed System Accelerate and improve the process of heat treating and quenching aluminum alloy components by building and testing a novel fluidized bed system for automated in-line quenching of individual parts.				
TechSolve, Inc. Cincinnati, OH	Gary N. Conley 513-948-2100	$2,997,621	$6,013,979	1/1/2003

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
Other participants: • DELPHI, Energy & Chassis Systems Dayton, OH • Applied Grinding Technologies Wixom, MI • Landis Gardner - A Unova Company Waynesboro, PA • Purdue University West Lafayette, IN				
Intelligent Optimization and Control of Grinding Processes Develop an intelligent system that uses techniques of soft computing and artificial intelligence to learn, control, monitor, and optimize a variety of complex precision-grinding processes without resorting to trial and error.				
Telecontinuity, Inc. Rockville, MD	Roy Pinchot 301-681-9108	$1,747,400	$1,961,510	1/1/2003
Disaster-Proof Telecommunications Technology Develop a system to guarantee telephone call delivery and dial tone in order to maintain telecommunications continuity during and following terror attack, natural disaster, equipment failure, or human error by combining the capabilities of the Public Switched Telephone Network (PSTN) and the Internet.				
Tepha, Inc. Cambridge, MA	Dr. David P. Martin 617-492-0505 X 214	$2,000,000	$3,016,760	3/1/2002
Treatment of Cardiovascular Disease Using Tissue Engineering Develop novel elastic biomaterial scaffolds seeded with a patient's own cells to engineer structures (valves, vessel, patches) for use in repair of damaged cardiovascular tissue.				
Teranex, Inc. Orlando, FL Other participants: • Sarnoff Corporation Princeton, NJ	Jason Crew 407- 858-6045	$2,771,621	$5,656,371	3/1/2002
Reference-Free Video Quality Measurement Develop and demonstrate methods and technologies for automatically monitoring the perceived quality of digital video without the original video source material as a reference.				
Thar Technologies, Inc. (formerly Thar Designs, Inc.), Pittsburgh, PA	Brian Moyer 412- 826-3939 x224	$1,902,402	$2,472,882	3/1/2002
A Novel Vapor Compression System Utilizing Carbon Dioxide Design a miniature, low-cost vapor compression system -- a "cooler on a chip" -- for microelectronics applications that is cost effective, energy efficient, and uses a natural refrigerant.				
The Athena Group, Inc. Gainesville, FL	Pat Rugg 352-371-2567 X 110	$1,999,859	$2,821,945	1/1/2003

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
PowerFlow: Next-Generation Intellectual Property Technology for System-on-a-Chip Designs Develop a system-on-a-chip architecture that blends the flexibility of fully programmable microprocessors with the high performance of function-specific processors, radically lowering design costs and speeding development of devices for embedded applications.				
The Maxima Corporation San Diego, CA	Saul Umbrasas 858-643-1700 X 117	$2,000,000	$3,544,637	1/1/2003
Development of Solid State Long Wave Infra-Red (LWIR) Laser Develop a novel solid-state laser technology that can operate at the longer wavelengths, thus much less affected by fog or rain fade, to enable the establishment of reliable free-space optical communications for low-cost, high-speed, last-mile interconnection.				
TIAX LLC Cambridge, MA	Twig Mowatt 617-498-7366	$1,966,635	$4,156,434	1/1/2003
Solid Oxide Fuel Cells (SOFC) Promise to Revolutionize Small-to-medium-scale Power Generation Design and demonstrate technologies for low-cost solid oxide fuel cells that use novel materials to interconnect components and thereby increase durability and power.				
Umbanet Inc. New York , NY	Michelle Baker 212- 633-7026	$2,000,000	$2,391,600	3/1/2002
Security Architecture for Component-Based Email with Application to Clinical Trials Data Management Design and prototype a secure software architecture for component-based electronic mail that greatly simplifies the secure use of email for conducting transactions and exchanging data.				
UtopiaCompression Corporation Los Angeles, CA	Dr. Jacob Yadegar 310-473-1500	$2,000,000	$3,231,234	3/1/2002
An Advanced Disruptive, Intelligent-Based Image Compression Technology Develop a novel, conceptually driven compression technology employing artificial intelligence techniques to efficiently and accurately model and reconstruct images to achieve high compression ratio and enhanced image quality.				
JamSession (formerly Valaran Corporation) Princeton, NJ	Dr. Aleta Ricciardi 609-945-7223	$1,818,916	$3,039,781	1/1/2003
Software Infrastructure to Support Impromptu Collaboration Among Multiple Mobile Device Users Develop and test telecommunications software that enables secure collaboration among multiple parties in impromptu groups using heterogeneous mobile wireless devices.				
Varian Medical Systems Mountain View, CA Other participants: Palo Alto Research Center, Palo Alto, CA	Spencer Sias 650-424-5782	$5,873,013	$11,759,104	1/1/2003
Novel X-ray Security Systems: Fast, Accurate And Affordable Develop large-area digital X-ray inspection systems with heretofore-unavailable accuracy for near error-free screening of cargo and sealed container freight at airports, seaports, and other points of entry.				

AWARDEE/PARTICIPANTS	CONTACT/PHONE	TOTAL ATP AWARD	PROJECT TOTAL	YEAR
Virent Energy Systems LLC Madison, WI	Tony Hartmann 608-663-0228	$1,972,703	$2,553,278	1/1/2003
Small-scale Hydrogen Generation via Aqueous-Phase Carbohydrate Reforming Develop and demonstrate catalyst and reactor technologies that use non-flammable, renewable feedstocks to produce hydrogen for fuel cells offering five times the energy density of advanced batteries.				
Xcerla Corporation Morgan Hill, CA	Dr. Jian Zhang 408-807-9069	$1,058,025	$1,160,934	3/1/2002
Scalable and Reliable Accounting Engine for Inter-Networked Services Design and prototype a core accounting engine that is flexible and scalable to accommodate a wide range of business models and pricing structures, and reliable to support mission-critical enterprise and carrier services enabling a new generation of networked services.				
Xencor Monrovia, CA	Dr. Arthur Chirino 626-737-8034	$2,000,000	$4,568,810	3/1/2002
Rational Design of Non-Immunogenic Proteins Redesign and re-engineer therapeutic proteins to be less immunogenic by using innovative computational methods to identify and replace antigenic protein regions (epitopes) for improved safety and efficacy.				
Xradia, Inc. Concord, CA	Wenbing Yun 925-288-1818	$2,000,000	$2,665,454	3/1/2002
Achromatic Fresnel Optic for EIV and X-ray Radiation: An Innovative Camera Concept for Next Generation Lithography Develop and demonstrate a novel camera concept for next-generation semiconductor lithography and inspection tools operating in the extreme ultraviolet (soft X-ray) spectral region using a new concept for an achromatic lens that is much simpler and potentially less expensive than competing EUV optical systems.				
XtremeSpectrum, Inc. Vienna, VA Other participants: • Motorola, Inc. Plantation, FL	Matthew Welborn 703-269-3052	$4,873,342	$9,945,595	3/1/2002
Fireground Personnel Location and Communication System Develop and demonstrate the technologies for an ultra-wideband Personnel Radiolocation System designed to track firefighters inside buildings to within 1 to 2 feet on the correct building floor.				
Zoesis, Inc. Newton, MA	Brian Loyal 617-969-2394	$2,000,000	$2,739,745	3/1/2002
Advanced Interactive Characters Develop, integrate, and test new language processing, artificial intelligence, and graphics capabilities for richly interactive characters that are expressive and appear to be intelligent and understanding of the human viewer/user.				

Appendix 3

Competition Statistics

	Batch 1	Batch 2	Batch 3	Total
	Oct 2002 & May 2003	July 2003	Sept 2003	
Number of Proposals Received	472	136	467	1,075
Number of Participants in Submitted Proposals	529	167	524	1,220
Total ATP Funding Requested	$917 M	$269 M	$1,039 M	$2,225 M
Total Industry Cost Share	$818 M	$166 M	$736 M	$1,720 M
Number of Awards	47	16	44	107
Joint Ventures	7	3	9	19
Single Applicants	40	13	35	88
Number of Participants in Awarded Projects	62	23	74	159
Total ATP Funds Committed	$115 M	$36 M	$105 M	$256 M
Total Industry Cost Sharing	$98 M	$22 M	$75 M	$195 M
Award Size for Projects	$434 K-11.9 M	$1.9 M-4.4 M	$695 K-6.4 M	$435 K-11.9 M
Average Award Size for Projects	$2.4 M	$2.4 M	$2.4 M	$2.4 M

ATP Competition Results: FY 2002/2003:

- Of the 107 awards shown above, a total of 44 different universities participate in 46 awards as either a subcontractor or joint venture participant. Approximately $21.5 M of ATP funds support this involvement.
- During FY2002, ATP awardees reported 222 new publications and 139 U.S. patents related to work underway on ATP projects.

During FY2003:

- ATP technical and business staff provided project management oversight for over 270 active awards.
- ATP's Economic Assessment Office produced 20 new fact sheets dealing with ATP awardees, 12 new program related publications, and oversaw the development of 50 new status reports for completed projects.
- ATP provided competitively awarded contracts to private research organizations for the purpose of preparing studies dealing with the assessment of technology trends in key bellwether areas. These studies serve to augment ATP's understanding of current high-risk technology trends. They include two tactical reports ("Digital Optical Holography" and "Ontological Representation of Knowledge") and one technology monitoring white paper on Biomanufacturing.

About the Advanced Technology Program

The Advanced Technology Program (ATP) bridges the gap between the laboratory and the market place through research partnerships with the private sector. ATP's early stage investments accelerate the innovation of new products and processes that contain enabling technologies that private investors consider too risky. The ATP changes the way U.S. industries approach high-risk research by providing a mechanism for industry to extend its technological reach and push out the envelope of what can be attempted.

The ATP views R&D projects from a broad perspective. In sharing the relatively high risks of developing technologies that could enable a broad range of new commercial opportunities, the ATP fosters projects with a high pay-off for the nation as a whole-in addition to a direct return to the innovators.

The ATP has several features that set it apart from other government R&D programs:

- For-profit companies conceive, propose, and execute ATP projects, often in alliance with other companies, academia, not-for-profit organizations, and federal labs. All industries and all fields of science and technology are eligible for funding. For-profit companies retain rights to all intellectual property developed in a project.
- The ATP award is a cost-share agreement. Joint Ventures (two or more for-profit companies working together) pay at least half of all project costs. Large, Fortune 500 companies participating as single firms must pay at least 60 percent of total project costs. Small and medium-sized companies working on single-company ATP projects must pay a minimum of all indirect costs associated with the project.
- The ATP does not fund basic research or product development.
- The ATP awards are made strictly on the basis of rigorous peer-reviewed competitions. Selection is based on scientific and technological merit, and strong potential for broad-based economic benefits to the nation. All proposals are assured a confidential, technically competent review even if they involve a broad, multi-disciplinary mix of technologies.
- ATP's support does not become a perpetual subsidy or entitlement-each project has goals, specific funding allocations, and completion dates established at the start. Projects are monitored and can be terminated for cause before completion.

More than 60% of ATP awards have gone to small businesses or to joint ventures led by a small business. Of the projects selected for awards since ATP's inception in 1990, well over half of the projects include one or more universities as either subcontractors or joint-venture members. More than 165 universities are participating in ATP projects.

For more information, or to be put on the ATP mailing list:

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